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INSTALLATION RESTORATION PROGRAM

PHASE I - RECORDS SEARCH

BLYTHEVILLE AFB, ARKANSAS

PREPARED FOR

UNITED STATES AIR FORCE
STRATEGIC AIR COMMAND

Deputy Chief of Staff
Engineering and Services
Offutt AFB, Nebraska 68113

AUGUST 1985

NOTICE

This report has been prepared for the United States Air Force by Engineering-Science for the purpose of aiding in the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, nor the Department of Defense.

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EXECUTIVE SUMMARY

The Department of Defense (DOD) has developed a program to identify and evaluate past hazardous material disposal sites on DOD property, to control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from these past disposal operations. This program is called the Installation Restoration Program (IRP). The IRP has four phases consisting of Phase I, Installation Assessment/Records Search; Phase II, Confirmation/Quantification; Phase III, Technology Base Development; and Phase IV, Remedial Actions. Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I, Installation Assessment/Records Search for Blytheville Air Force Base (AFB) under Contract No. F08637 84 C0070.

INSTALLATION DESCRIPTION

Blytheville AFB is located in the northeast corner of Arkansas, approximately two miles northwest of Blytheville, Arkansas. Land use immediately surrounding the base includes agricultural, residential and commercial areas. The main base site consists of approximately 3,700 acres comprised of runways and airfield operations, industrial areas, housing and recreational facilities. One remote installation that was included in the study was a one-acre site with a navigation marker located north of the base.

Blytheville AFB began as the Blytheville Army Air Field which was established in June 1942. The field was used as an advance flying school in the Southeastern Training Command's pilot training program. The installation was deactivated in October 1945 and the land was placed under the administrative control of Air Material Command who then turned the base over to the City of Blytheville.

From 1947 to 1954 the site uses included furniture manufacturing, trailer manufacturing, paint manufacturing, a church and cemetery, a skating rink, a bar, an airport, and private housing. Between 1950 and

1954, the City of Blytheville operated a landfill on the adjacent land southeast of the base. This property later became part of the base when Blytheville AFB was reactivated.

Blytheville AFB was reactivated in 1955 under the control of the Tactical Air Command (TAC). In 1958 the base was transferred from TAC to Strategic Air Command (SAC). Blytheville AFB has seen a variety of aircraft during its operation from the BT-13 and AT-10 trainers during the World War II era to the B-57 medium range bombers during the 1950's, to the B-52 stratofortresses and KC-135 and RC-135 aircraft which have operated out of Blytheville since the early 1960's. Blytheville AFB has been operated under SAC since 1958, with a mission which has been basically unchanged.

ENVIRONMENTAL SETTING

The environmental setting information for Blytheville AFB indicates the following data are important when evaluating past hazardous waste disposal practices.

- There is some potential for degrading the quality of ground water underlying the base. Net precipitation, an indicator for the potential of leachate generation resulting from rainfall, is moderate. However, the poor infiltration characteristics of most soils on the base, coupled with the occurence of relatively impermeable sandy clay and clay near land surface, aids in minimizing this potential.
- There is probably a good potential for the off-base transport of surface contaminants. The one-year, 24-hour rainfall event, which is used to aid in judging the potential for erosion and runoff, is high. Most of the soils on the base have poor infiltration characteristics, which also promotes runoff. However, the land slopes on the base are gentle. This fact tends to partially offset the effects of high rainfall intensity and poor soil infiltration characteristics for transporting contaminants.

- Two aquifers underlying BAFB are used for water supply. Sands and gravels at depths 30 to 100 feet below land surface are used as a source of water supply by rural residences and as a source of water for irrigation. Sands within the Wilcox formation at a depth of 1,300 to 1,400 feet are used as a source of water supply for the base and for municipalities in the base vicinity.
- The base receives its potable water supply from two wells completed in the Wilcox formation. Nearby municipalities also receive their water supply from the Wilcox formation. The water quality from the base wells is generally good.
- Flooding potential at the base is minimal. Most of the base lies above the limits of the 100-year flood event.
- Runoff from the base does not appear to adversely impact the quality of nearby surface waters. This conclusion is based on semi-annual sampling of runoff waters from the base.
- There are no known species of threatened or endangered plants or animals in residence at Blytheville AFB.

METHODOLOGY

During the course of this project, interviews were conducted with installation personnel (past and present) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with local, state and federal agencies; and field surveys were conducted at suspected past hazardous waste activity sites.

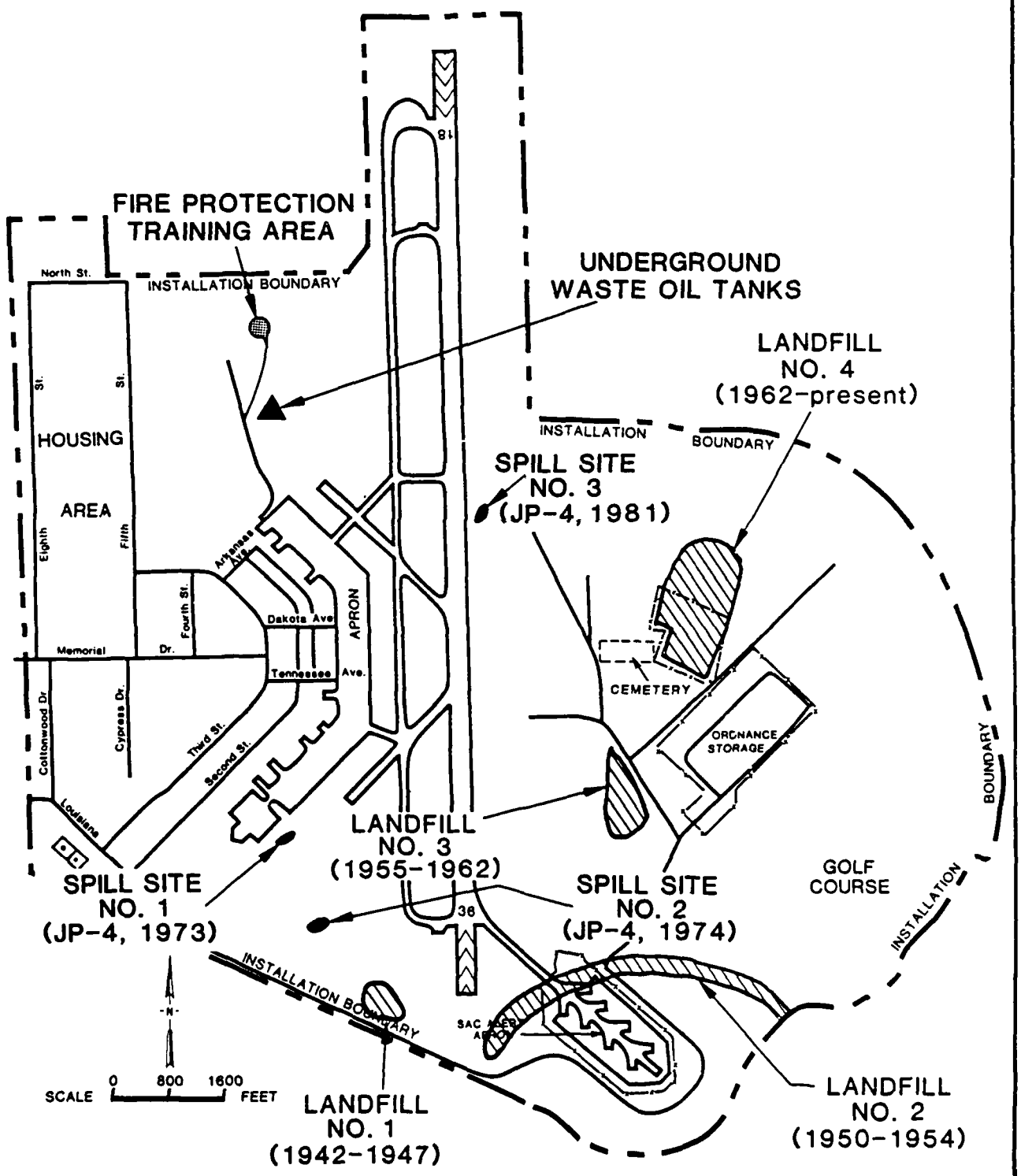
FINDINGS AND CONCLUSIONS

The following conclusions have been developed based on the results of the project team field inspection, reviews of base records and files, interviews with base personnel, and evaluations using the HARM system. Nine sites (Figure 1) were identified as potentially containing hazardous contaminants and having the potential for contaminant migration resulting from past activities. These sites have been assessed using a Hazard Assessment Rating Methodology (HARM) which takes into account factors such as site characteristics, waste characteristics, potential

FIGURE 1

BLYTHEVILLE AFB

SITES OF POTENTIAL ENVIRONMENTAL CONTAMINATION



SOURCE: INSTALLATION DOCUMENTS

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for contaminant migration and waste management practices. The details of the rating procedure are presented in Appendix G and the results of the assessment are given in Table 1. The rating system is designed to indicate the relative need for follow-up investigation.

The areas found to have potential to create environmental contamination are as follows:

- Fire Protection Training Area
- Spill Site No. 2
- Spill Site No. 1
- Spill Site No. 3
- Underground Waste Oil Tanks
- Landfill No. 4
- Landifll No. 2
- Landfill No. 1
- Landfill No. 3

RECOMMENDATIONS

A program for proceeding with Phase II and other IRP activities at Blytheville AFB is presented in Section 6. This program may be expanded to define the extent and type of contamination if the initial step reveals contamination. The Phase II recommendations presented in Section 6 are summarized below.

Fire Protection Training Area

The extent of potential contamination at the Fire Protection Training Area should be assessed by the implementation of an integrated program including a geophysical survey, soil borings to the depth of the water table, collection of soil samples at 5-foot intervals and depths of high OVA readings, monitoring well installation, and groundwater sampling of the water table aquifer.

Spill Site No. 2

At Spill Site No. 2, the extent of potential contamination would be assessed by conducting a geophysical survey, followed by soil boring to the water table, and soil sampling at 5-foot intervals and at depths of high OVA readings.

TABLE 1
SITES EVALUATED USING THE
HAZARD ASSESSMENT RATING METHODOLOGY
BLYTHEVILLE AFB

Rank	Site	Operation Period	HARM Score(1)
1	Fire Protection Training Area	1955-Present	73
2	Spill Site No. 2	1973-1974	73
3	Spill Site No. 1	1973-1974	67
4	Spill Site No. 3	1981	62
5	Underground Waste Oil Tanks	1972-Present	61
6	Landfill No. 4	1962-Present	56
7	Landfill No. 2	1950-1954	55
8	Landfill No. 1	1942-1947	54
9	Landfill No. 3	1955-1962	53

(1) This ranking was performed according to the Hazard Assessment Rating Methodology (HARM) described in Appendix G. Individual rating forms are in Appendix H.

Spill Site No. 1 and Spill Site No. 3

Environmental investigation at Spill Site No. 1 and Spill Site No. 3 would consist of soil boring to the depth of the water table, and soil sampling at 5-foot intervals and at depths of high OVA readings.

Underground Waste Oil Tanks

The extent of potential contamination at the underground waste oil tanks would be assessed by conducting soil borings to the water table and soil sampling at 2-foot intervals and at depths of high OVA readings.

Landfills

The extent of potential environmental contamination at the landfill areas (Nos 1-4) should initially be assessed by conducting a geophysical survey at each site. Based on the results of this survey, upgradient and downgradient monitoring wells should be installed in the water table aquifer, and groundwater should be sampled for oil and grease, volatile organic compounds, phenolics, and lead.

SECTION 1

INTRODUCTION

BACKGROUND AND AUTHORITY

The United States Air Force, due to its primary mission of defense of the United States, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. Federal, state, and local governments have developed strict regulations to require that disposers identify the locations and contents of past disposal sites and take action to eliminate hazards in an environmentally responsible manner. The primary Federal legislation governing disposal of hazardous waste is the Resource Conservation and Recovery Act (RCRA) of 1976, as amended. Under Section 6003 of the Act, Federal agencies are directed to assist the Environmental Protection Agency (EPA) and under Section 3012, state agencies are required to inventory past disposal sites, and Federal agencies are required to make the information available to the requesting agencies. To assure compliance with these hazardous waste regulations, the Department of Defense (DOD) developed the Installation Restoration Program (IRP). The current DOD IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated 11 December 1981 and implemented by Air Force message dated 21 January 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the Installation Restoration Program. DOD policy is to identify and fully evaluate suspected problems associated with past hazardous contamination, and to control hazards to health and welfare that resulted from these past operations. The IRP is the basis for response actions on Air Force installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, clarified by Executive Order 12316. CERCLA is the primary legislation governing remedial action at past hazardous waste disposal sites.

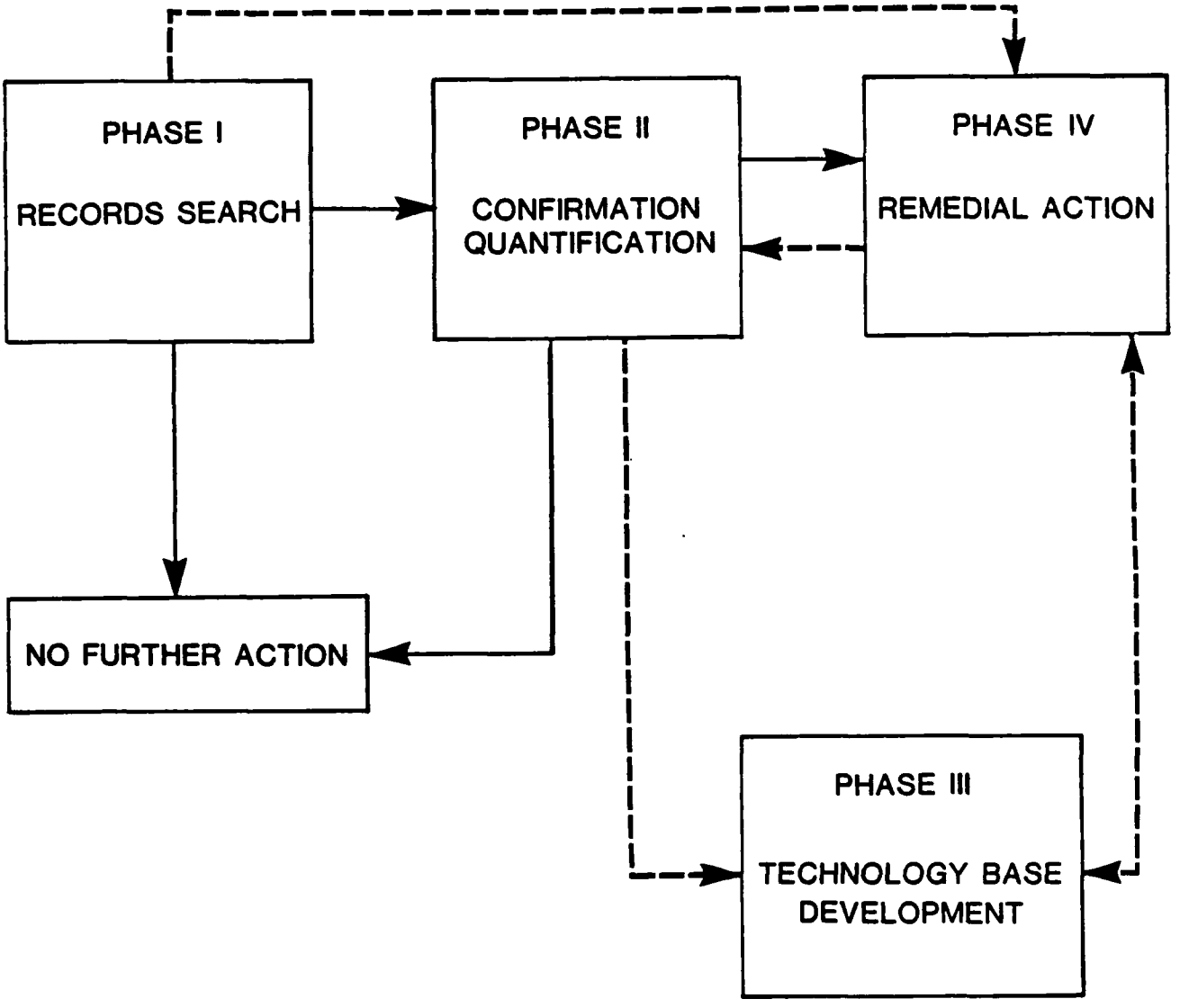
PURPOSE AND SCOPE

The Installation Restoration Program is a four-phased program (Figure 1.1) designed to assure that identification, confirmation/quantification, and remedial actions are performed in a timely and cost-effective manner. Each phase is briefly described below:

- Phase I - Installation Assessment/Records Search - The objective of Phase I is to identify and prioritize those past disposal sites that may pose a hazard to public health or the environment as a result of contaminant migration to surface or ground waters, or have an adverse effect by its persistence in the environment. In this phase it is determined whether a site requires further action to confirm an environmental hazard or whether it may be considered to present no hazard at this time. If a site requires immediate remedial action, such as removal of abandoned drums, the action can proceed directly to Phase IV. Phase I is a basic background document for the Phase II study.
- Phase II - Confirmation/Quantification - The objective of Phase II is to define and quantify, by preliminary and comprehensive environmental and/or ecological survey, the presence or absence of contamination, the extent of contamination, waste characterization (when required by the regulatory agency), and to identify sites or locations where remedial action is required in Phase IV. Research requirements identified during this phase will be included in the Phase III effort of the program.
- Phase III - Technology Base Development - The objective of Phase III is to develop a sound data base upon which to prepare a comprehensive remedial action plan. This phase includes implementation of research requirements and technology for objective assessment of adverse effects. A Phase III requirement can be identified at any time during the program.
- Phase IV - Operations/Remedial Actions - The objective of Phase IV is to prepare and implement a remedial action plan.

FIGURE 1.1

U.S. AIR FORCE INSTALLATION RESTORATION PROGRAM



SOURCE: AFESC

Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I Records Search at Blytheville AFB under Contract No. F08637 84 C0070. This report contains a summary and an evaluation of the information collected during Phase I of the IRP and recommended follow-on actions. The land area included as part of Blytheville AFB study is as follows:

Blytheville AFB - 3,738 acres
Navigation Marker - 1 acre

The activities performed as a part of the Phase I study scope included the following:

- Review of site records
- Interviews with personnel familiar with past generation and disposal activities
- Survey of types and quantities of wastes generated
- Determination of current and past hazardous waste treatment, storage, and disposal activities
- Description of the environmental setting at the base
- Review of past disposal practices and methods
- Reconnaissance of field conditions
- Collection of pertinent information from federal, state and local agencies
- Assessment of the potential for contaminant migration
- Development of recommendations for follow-on actions

ES performed the on-site portion of the records search during March 1984. The following team of professionals were involved:

Ernest J. Schroeder, P.E., Project Manager, Environmental Engineer, 18 years of professional experience.

Susan J. Tiffany, Environmental Engineer, 3 years of professional experience.

Robert S. McLeod, P.E., Hydrologist, 22 years of professional experience.

A general ground tour and an overflight of the identified sites were made by the ES Project Team to gather site-specific information including: (1) general observations of existing site conditions; (2) visual evidence of environmental stress; (3) presence of nearby drainage ditches or surface waters; and (4) visual inspection of these water bodies for any obvious signs of contamination or leachate migration.

A decision was then made, based on all of the above information, whether a potential hazard to health, welfare or the environment exists at any of the identified sites using the Flow Chart shown in Figure 1.2. If no potential existed, the site received no further action. For those sites where a potential hazard was identified, a determination of the need for IRP evaluation/action was made by considering site-specific conditions. If no further IRP evaluation was determined necessary, then the site was referred to the installation environmental program for appropriate action. If a site warranted further investigation, it was evaluated and rated using the Hazard Assessment Rating Methodology (HARM). The HARM score is a resource management tool which indicates the relative potential for adverse effects on health or the environment at each site evaluated.

More detailed information on these three individuals is presented in Appendix A.

METHODOLOGY

The methodology utilized in the Blytheville AFB Records Search began with a review of past and present industrial operations conducted at the installation. Information was obtained from available records such as shop files and real property files, as well as interviews with 78 past and present base employees from various operating areas. Those interviewed included current and past personnel associated with civil engineering, fuels management, roads and grounds maintenance, fire protection, real property, history, and bioenvironmental engineering. A listing of interviewee positions with approximate years of service is presented in Appendix B.

Concurrent with the employee interviews, the applicable federal, state and local agencies were contacted for pertinent study area related environmental data. The agencies contacted are listed below and in Appendix B.

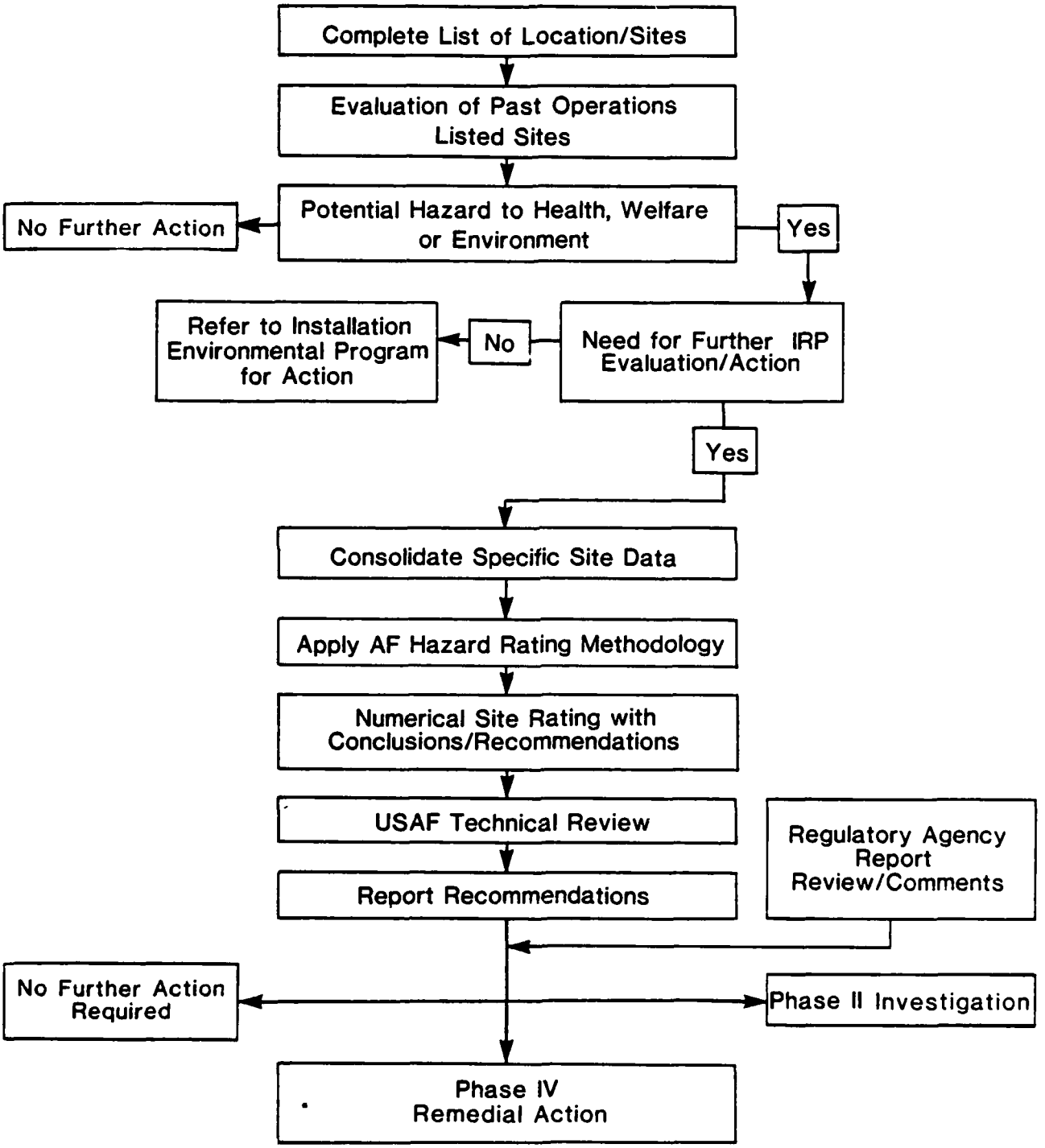
- Arkansas Department of Pollution Control and Ecology
- Arkansas Geological Commission
- Blytheville Waterworks
- U. S. Department of Interior, Geological Survey, Water Resoures Division
- National Archives, Cartographic and Architectural Branch and Modern Military Branch
- Washington National Record Center, Modern Military Field Branch
- U. S. Environmental Protection Agency, Region VI

Tne next step in the activity review was to identify all sources of hazardous waste generation and to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various sources on the base. Included in this part of the activities review was the identification of all known past disposal sites and other possible sources of contamination such as spill areas.

FIGURE 1.2

PHASE I INSTALLATION RESTORATION PROGRAM

RECORDS SEARCH FLOW CHART



Source: AFESC

SECTION 2

INSTALLATION DESCRIPTION

LOCATION, SIZE AND BOUNDARIES

Blytheville AFB is located in the northeast corner of Arkansas, approximately two miles north of Blytheville, Arkansas (Figures 2.1 and 2.2). Blytheville AFB is approximately three miles from the Missouri State line and 11 miles west of the Mississippi River. The base is bordered by open land to the north and west, scattered residential to the south and by the City of Blytheville on the southeast.

Blytheville AFB includes the main base comprising 3,738 acres (Figure 2.3), and with one remote location consisting of a navigation marker, 1 acre.

BASE HISTORY

Blytheville AFB began as the Blytheville Army Air Field which was established in June 1942. The field was used as an advance flying school in the Southeastern Training Command's pilot training program. The base continued as a training center until the end of World War II with BT-13 and AT-10 Trainers. The installation was deactivated in October 1945 and the land was placed under the administrative control of Air Material Command who then turned the base over to the City of Blytheville.

From 1947 to 1954 the site uses included furniture manufacturing, trailer manufacturing, paint manufacturing, a church and cemetery, a skating rink, a bar, an airport, and private housing. The manufacturing operations were small scale and no significant wastes were known to be generated by these operations. Between 1950 and 1954, the City of Blytheville operated a landfill on the adjacent land southeast of the base. This property later became part of the base when Blytheville AFB was reactivated.

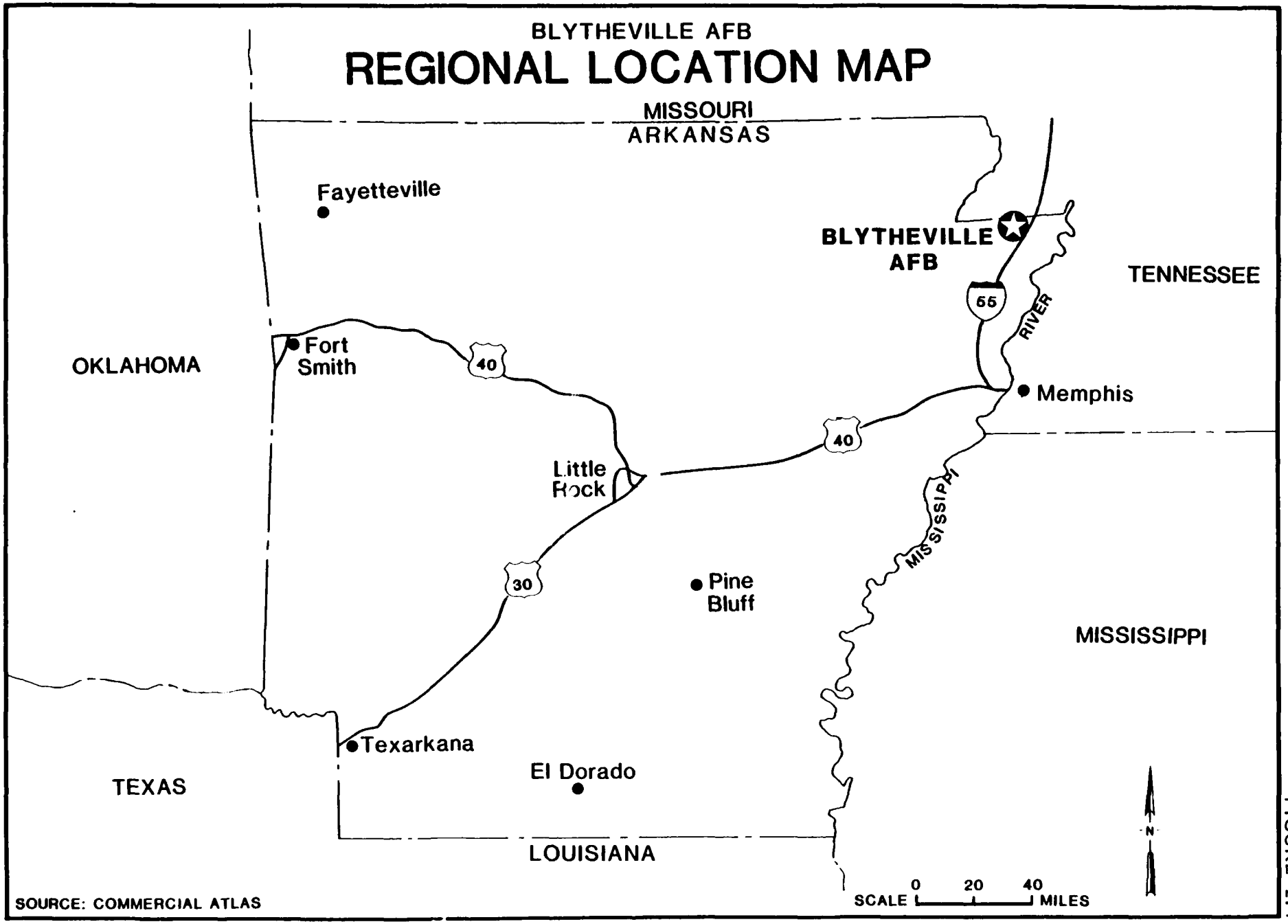


FIGURE 2.1

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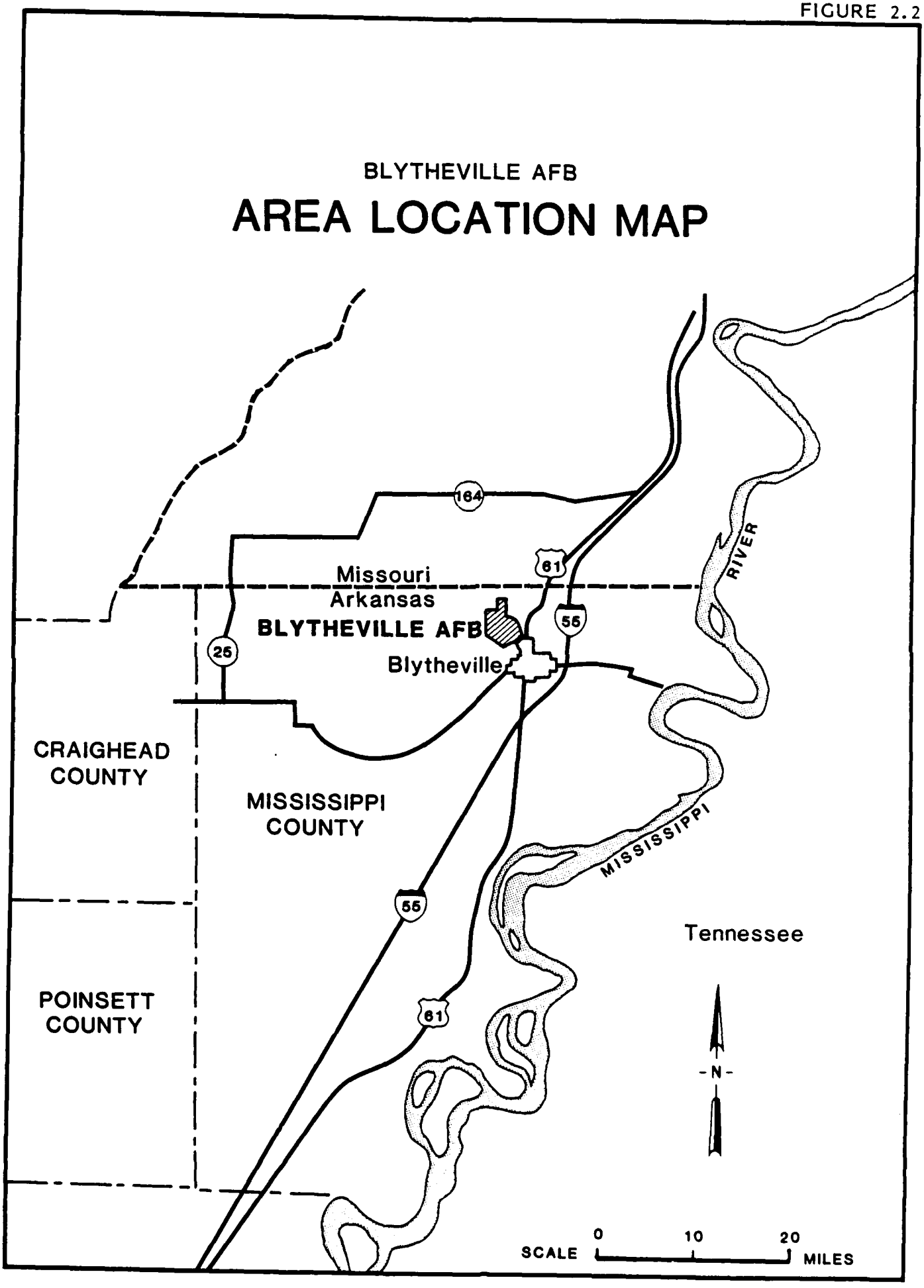
FIGURE 2.2



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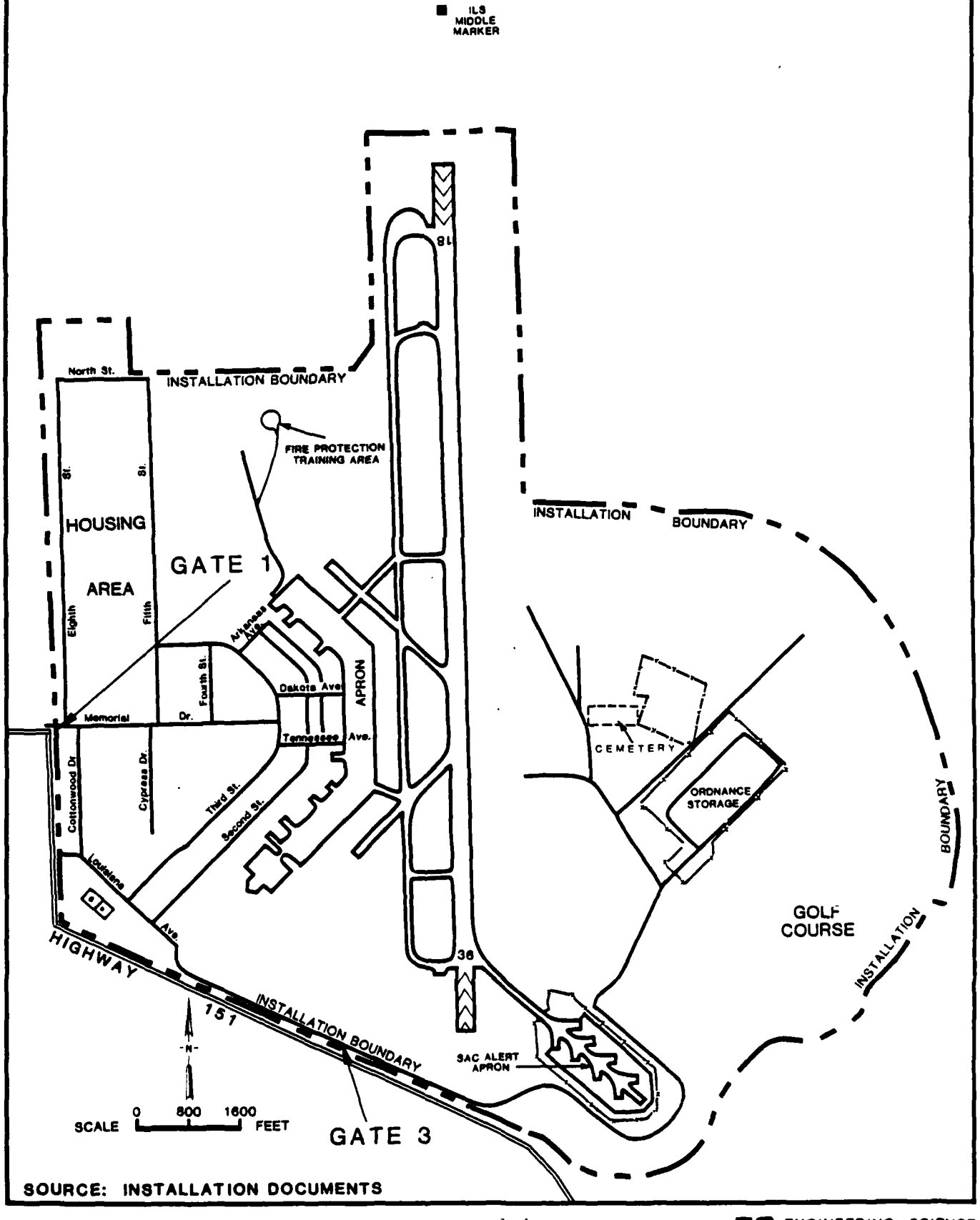
BLYTHEVILLE AFB

INSTALLATION SITE PLAN



SOURCE: INSTALLATION DOCUMENTS

Blytheville AFB was reactivated in 1955 under the control of the Tactical Air Command (TAC). In 1958 the base was transferred from TAC to Strategic Air Command (SAC). The base has been the home of the 97th Bombardment Wing (SAC) and its supporting organization from July 1959 to the present. Blytheville AFB has seen a variety of aircraft during its operation from the BT-13 and AT-10 trainers during the World War II era to the B-57 medium range bombers during the 1950's, to the B-52 stratofortresses and KC-135 and RC-135 aircraft which have operated out of Blytheville since the early 1960's.

Blytheville AFB has been operated under SAC Command since 1958, with a mission which has been basically unchanged. Therefore, shop duties and functions have generally remained constant throughout the history of the Blytheville AFB.

Organization and Mission

The host unit at Blytheville AFB is the 97th Bomb Wing of the 42nd Air Division. The mission of the 97th Bombardment Wing is maintaining the capability of conducting strategic bombing operations on short notice in any portion of the world under Strategic Air Command. The 97th Combat Support Group, under the 97th Bomb Wing, maintains the base in support of the 97th. The tenant organizations at Blytheville AFB are listed below. Descriptions of the major tenant organizations and their missions are presented in Appendix C.

Detachment 14, 26th Weather Squadron
2101 Communications Squadron
3904 Management Engineering Squadron
Detatchment 814, Air Force Office of Special Investigation
Defense Property Disposal Office
USAF Postal and Courier Service
USAF Hospital

SECTION 3
ENVIRONMENTAL SETTING

The environmental setting at Blytheville Air Force Base (BAFB) is described in this section. An emphasis is directed toward identifying features that may facilitate the movement off-base of any hazardous materials that may have been introduced into the environment within the base boundaries. Environmentally sensitive conditions pertinent to the study are highlighted at the end of this section.

METEOROLOGY

Two climatic features of interest in determining the potential for movement of contaminants are net precipitation and rainfall intensity. Net precipitation is an indicator for the potential of washing contaminants into the ground-water system and is equal to the difference between annual precipitation and annual lake evaporation. Rainfall intensity is an indicator for the potential of erosion and the transportation of contaminants by surface runoff. The one-year, 24-hour rainfall is used to aid in estimating this potential.

Net precipitation at BAFB indicates that there is some potential for the migration of surface or subsurface contamination to the ground-water reservoir. Net precipitation is about 10 inches which is considered to be moderate. Mean annual precipitation at the base for the period December, 1942 to December, 1982 was 49.7 inches (BAFB documents) while annual lake evaporation for the area is 40 inches (National Oceanic and Atmospheric Administration (NOAA), 1977). Selected meteorological data for BAFB are summarized in Table 3.1.

The one-year, 24-hour rainfall intensity is 3.5 inches, (NOAA, 1966) which is considered to be high. This suggests that there is a good potential for erosion and the transport of contaminants by surface runoff.

TABLE 3.1
SUMMARY OF SELECTED METEOROLOGICAL DATA
FOR BLYTHEVILLE AIR FORCE BASE, SEPTEMBER, 1942 TO DECEMBER, 1982

MONTH	Temperature (°F)			Precipitation (In)				Snowfall (In)		
	Mean Daily		Mean	Monthly			24 Hrs.	Monthly		24 Hrs.
	Max	Min	Monthly	Mean	Max	Min	Max	Mean	Max	Max
JAN	43	28	36	3.7	8.9	0.8	4.2	3	11	6
FEB	48	32	40	3.9	9.7	0.9	3.3	2	12	5
MAR	59	41	50	5.1	12.6	0.2	4.6	2	14	9
APR	70	51	61	5.3	8.5	0.5	5.2	<1	<1	<1
MAY	80	60	70	5.4	12.5	0.9	3.2	0	0	0
JUN	87	68	78	4.0	9.4	1.1	3.6	0	0	0
JUL	90	71	81	3.4	6.3	0.5	3.1	0	0	0
AUG	88	69	79	3.5	9.3	0.8	3.4	0	0	0
SEP	82	62	72	3.9	10.8	<0.1	4.1	0	0	0
OCT	73	50	62	2.5	7.2	<0.1	4.1	0	0	0
NOV	59	41	50	4.4	13.5	0.0	4.4	<1	6	3
DEC	48	33	41	4.6	11.9	0.8	4.1	1	8	7
ANN	69	51	60	49.7	13.5	0.0	5.2	8	1	9

The symbol < means less than.

Source: BAFB documents

GEOGRAPHY

BAFB is located in Mississippi County, Arkansas, which is in the northeastern corner of the state. The base is approximately one mile west of the City of Blytheville and about 11 miles west of the Mississippi River. The base location is shown in Figure 3.1.

The base is within the Mississippi Alluvial Plain of the Coastal Plain physiographic province (Figure 3.1). The Alluvial Plain is an extensive flat lowland plain. Streams in this plain are sluggish and meandering.

Topography and Drainage

The topography in the vicinity of the base is typical of a flood plain for the Mississippi River. The land slopes gently downward towards the west from the natural levees bordering the river.

The topography at the base is relatively flat (Figure 3.2). Most of the base is at an elevation of about 250 feet mean sea level (MSL). The lowest areas are at approximately 245 feet MSL and occur at the southeast end of the base in the vicinity of Pemiscot Bayou and its tributaries and at the west and northwest ends of the base in the vicinity of Drainage Ditch No. 25 and its tributaries. The highest area is the firing range which is at an elevation of about 265 feet MSL.

Manmade topographic features of interest at BAFB are the drainage ditches which have been constructed to aid in draining the base and the firing range.

BAFB is in the St. Francis River watershed (see Figure 3.1). The river originates in southeast Missouri and drains in a generally southerly direction through northeast Arkansas. The river discharges to the Mississippi River about 35 miles south of Memphis, Tennessee.

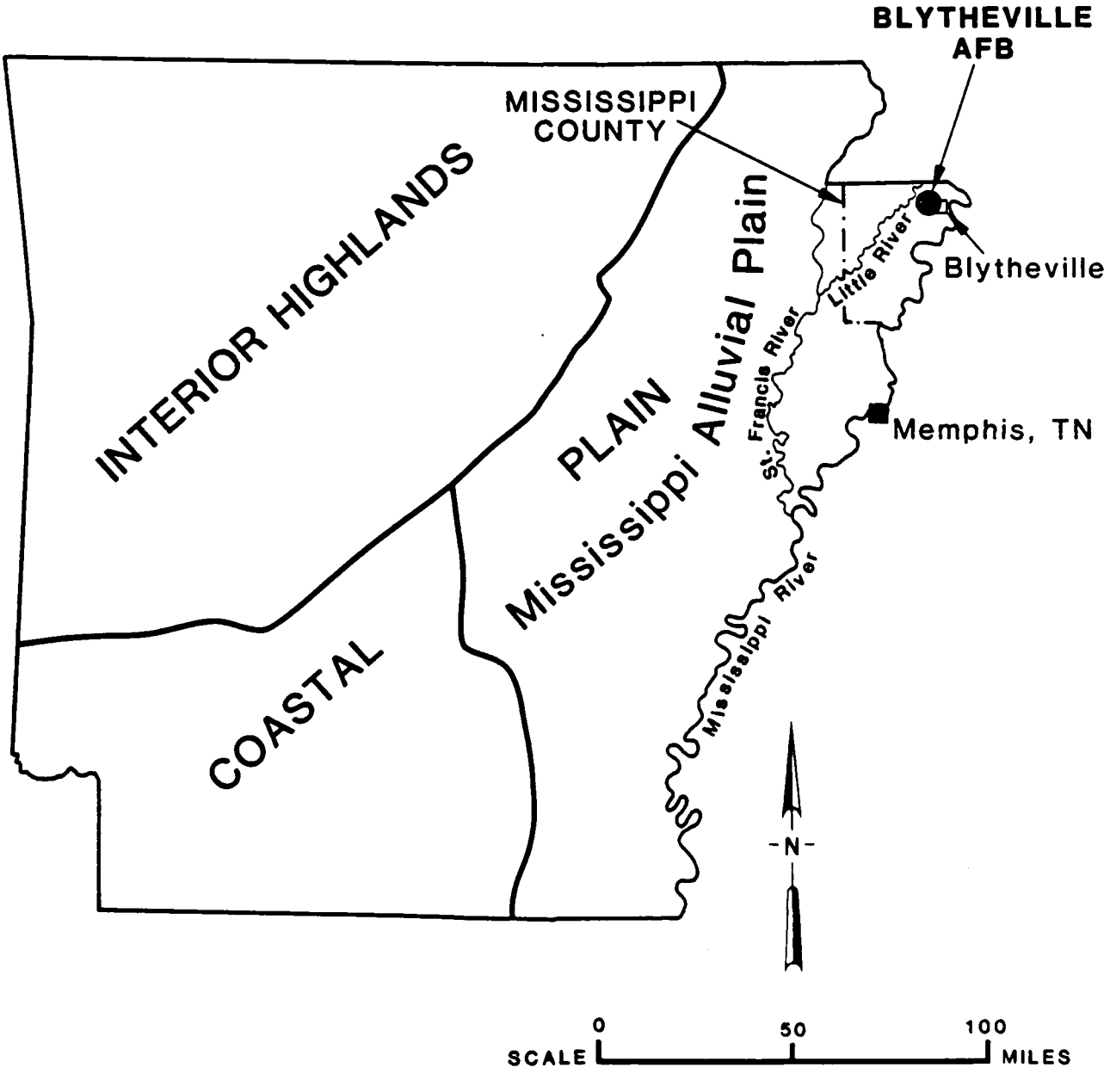
Runoff from rainfall on the base is directed either to Ditch No. 25 or to Pemiscot Bayou. Drainage west of the runway is generally to Ditch No. 25. Drainage east of the runway is to Pemiscot Bayou. A combination of open drainage ditches and storm drains is used to capture and direct runoff off-base. The storm drainage network on the base is shown in Figure 3.3.

Soils

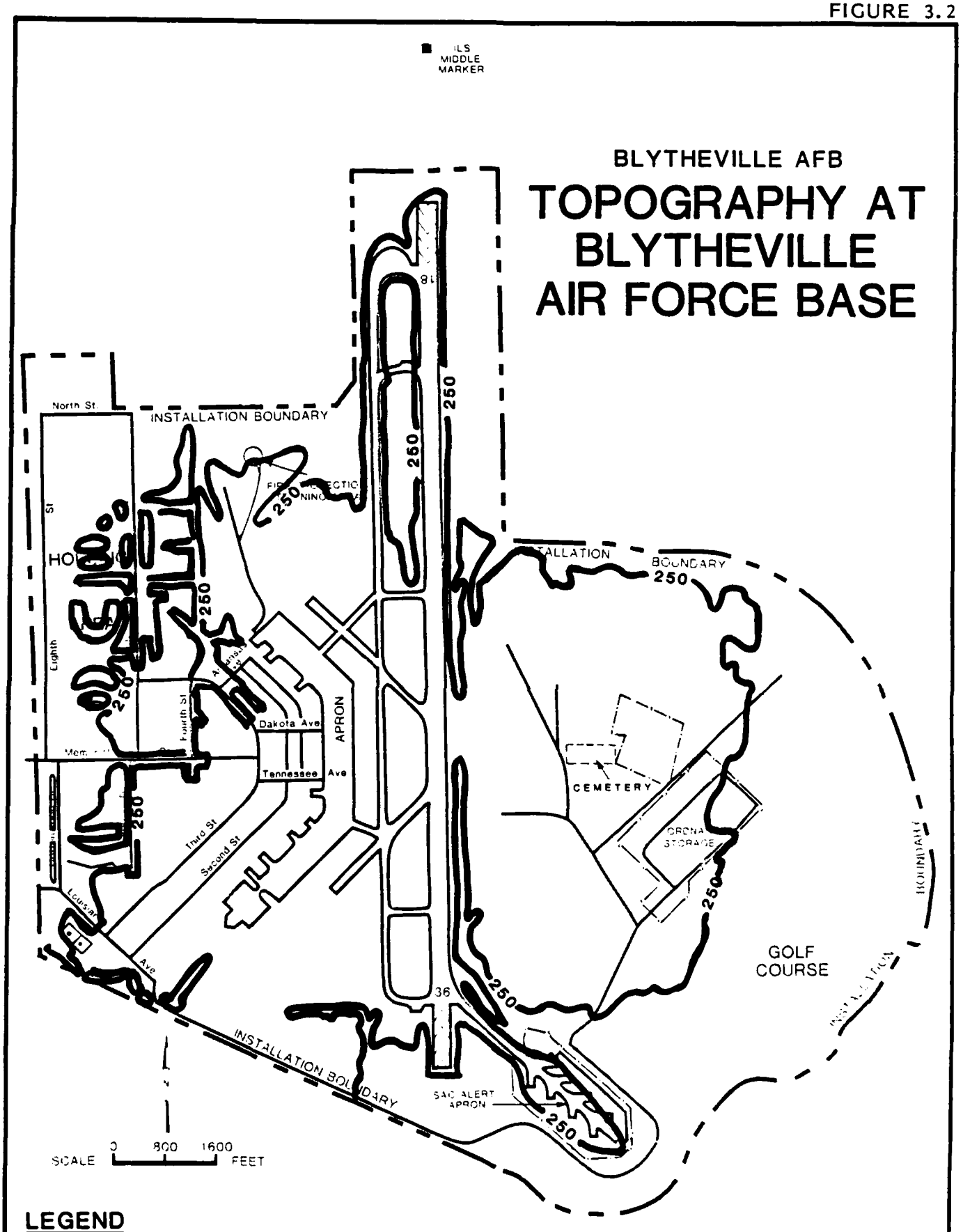
Soils on the base range from poorly drained soils that are loamy thoughout their thickness to well drained soils that are sandy

BLYTHEVILLE AFB

GENERAL GEOGRAPHY AND PHYSIOGRAPHIC FEATURES IN ARKANSAS



SOURCE: EDDS AND FITZPATRICK (1984)



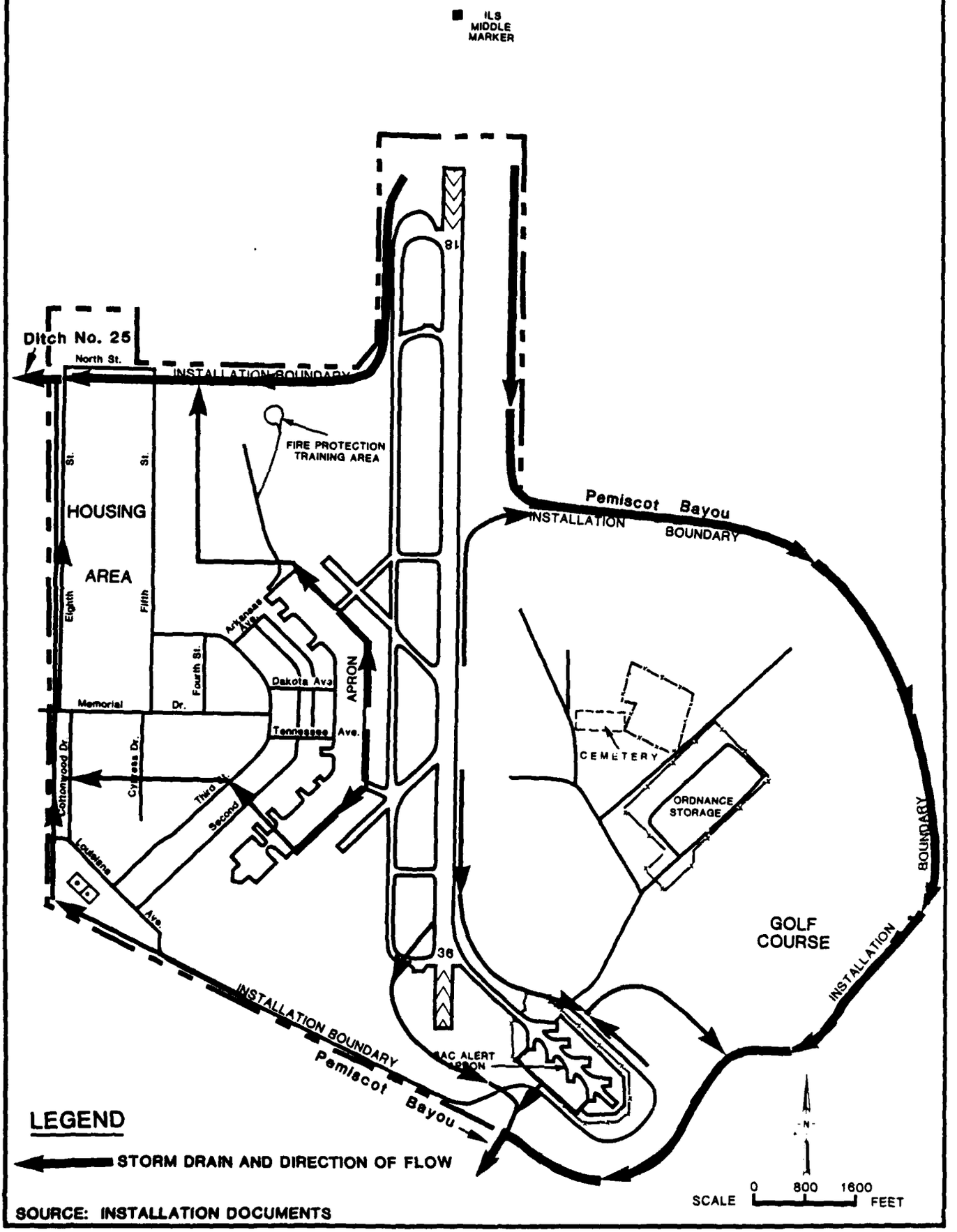
LEGEND

— 250 — TOPOGRAPHIC CONTOUR. SHOWS ELEVATION OF LAND SURFACE. DATUM IS MEAN SEA LEVEL.

SOURCE: USGS 1:24,000 BLYTHEVILLE AK-MO QUADRANGLE.

FIGURE 3.3

BLYTHEVILLE AFB
DRAINAGE MAP



SOURCE: INSTALLATION DOCUMENTS

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throughout their thickness (Soil Conservation Service (SCS), 1971). All of the soils are derived from alluvium. The general distribution of soils on the base is given in Figure 3.4 and the characteristics of these soils are summarized in Table 3.2.

The majority of soils on the base have poor infiltration characteristics. These soils typically are a sandy or silty loam at their surface. Their subsurface is generally composed of a silty to sandy clay loam or clay. These soils promote runoff and minimize infiltration of water to the subsurface.

The high one-year 24-hour rainfall intensity coupled with the poor infiltration characteristics of the soils on the base suggests that there is a good potential for the transport off-base of surface contaminants.

GEOLOGY

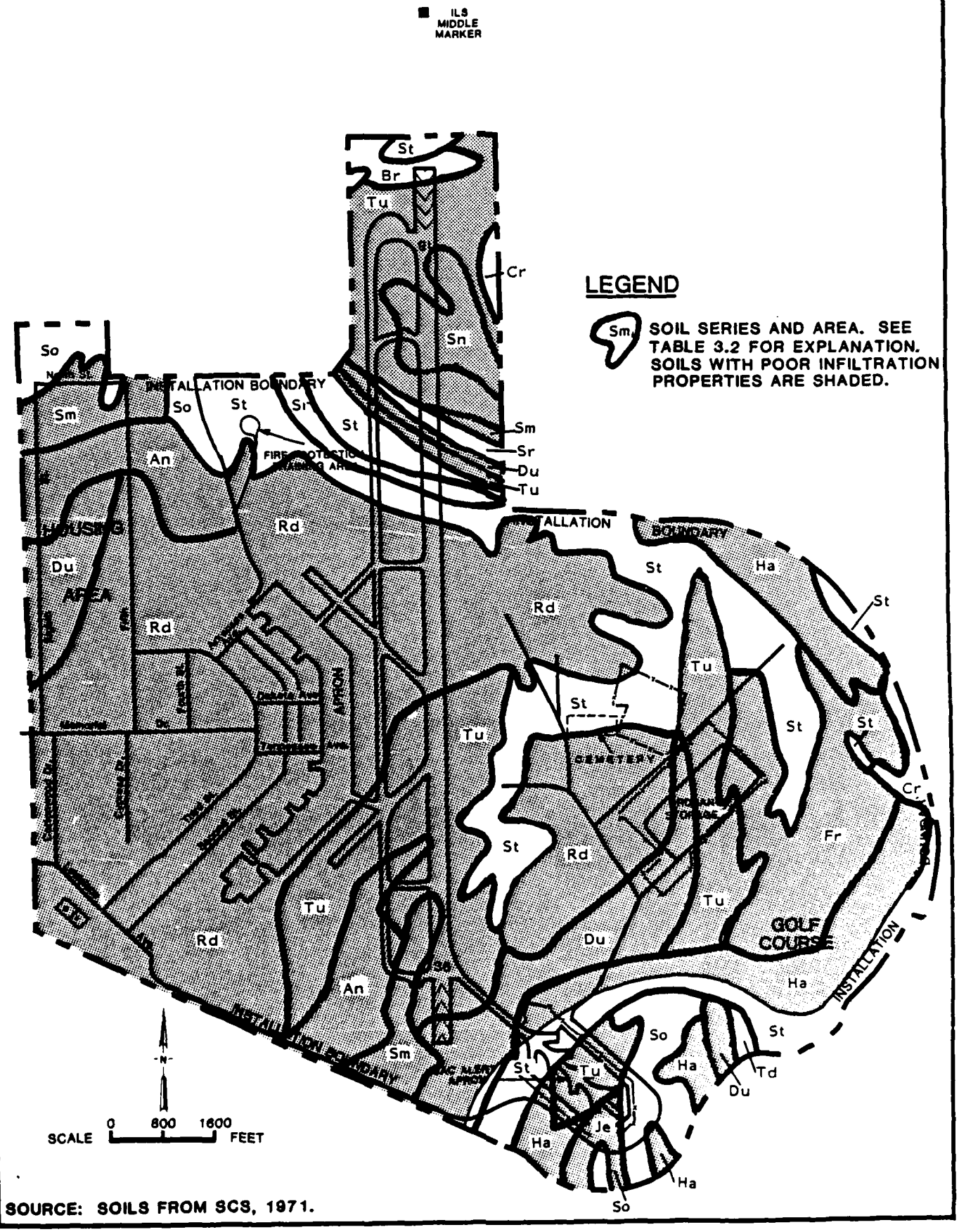
The oldest and deepest rocks encountered by drilling in the vicinity of the base are of Ordovician and Cambrian ages (Ryling, 1960). The Ordovician deposits are predominantly limestone while the Cambrian deposits are a dolomite. The combined thickness of these deposits is more than 1,700 feet.

Cretaceous age deposits overlie the Ordovician deposits in the base vicinity (Ryling, 1960). The Cretaceous deposits are predominantly a sand with some sandy shale and clay. The thickness of these deposits is about 650 feet.

Overlying the Cretaceous deposits in the base vicinity are deposits of Tertiary age (Ryling, 1960). The Tertiary deposits include, in ascending order, the Midway group, the Wilcox formation and the Claiborne group. The Midway group is about 600 feet thick and is composed mostly of clay. The Wilcox formation is mostly sand in its lower part and mostly clay in its upper part. This formation is about 475 feet thick. The Claiborne group consists of lignite, sand and shale in its lower part while the upper part of the group is mostly shale. The combined thickness of these deposits is about 800 feet.

Quaternary age deposits overlie the Tertiary deposits and occur from land surface to a depth of about 125 feet in the base vicinity

BLYTHEVILLE AFB
SOILS MAP



SOURCE: SOILS FROM SCS, 1971.

TABLE 3.2
SOIL SUMMARY FOR BLYTHEVILLE AIR FORCE BASE

Map Symbol	Unit Description	Dominant Texture	Unit Permeability[1] (Inches/Hour)	Infiltration Capability
An	Amagon sandy loam	Sandy to silty clay loam	0.06 - 2.0	Poor
Br	Bowdre silty clay loam	Fine sandy to silty clay loam	0.06 - 0.63	Moderately good
Bv	Bruno-Crevasse complex	Loamy sand to sandy loam	0.63 - >6.3	Excellent
Cr	Crevasse loamy sand	Loamy sand to sand	>6.3	Excellent
Du	Dundee silt loam	Silt to fine sandy loam	0.2 - 2.0	Somewhat poor
Fr	Forestdale-Routon Complex	Silty clay to sandy loam	<0.06 - 2.0	Poor
Ha	Hayti fine sandy loam	Fine sandy loam to loam	0.2 - 6.3	Poor
Je	Jeanerette silt loam	Silty clay loam to fine sandy loam	0.06 - 2.0	Poor
Rd	Routon-Dundee-Crevasse Complex	Sandy to silty clay loam	0.2 - 2.0	Poor
Sm	Sharkey-Steele Complex	Silty clay to clay	<0.06	Poor
Sn	Sharkey and Steele soils	Silty clay to clay	<0.06	Poor
So	Steele silty clay loam	Clay to loamy sand	0.2 - >6.3	Moderately good
Sr	Steele silty clay loam	Clay to loamy sand	0.2 - >6.3	Moderately good
St	Steele and Tunica soils	Clay to loamy sand	0.2 - >6.3	Moderately good
Td	Tiptonville and Dubbs silt loams	Fine sandy to silty loam	0.2 - 2.0	Moderately good
Tu	Tunica silty clay	Clay to silty loam	<0.06 - 0.63	Poor

(1) The symbol > means greater than.
The symbol < means less than.

Source: Soil Conservation Service, 1971.

(Ryling, 1960). The Quaternary deposits are composed of sandy clay, clay, sand and gravel.

Table 3.3 summarizes the geologic deposits in the order that these deposits would be encountered by drilling a well, with the oldest deposits at the bottom and the youngest deposits at the top. The water-bearing characteristics of these deposits is also summarized in the table.

HYDROLOGY

The ground water and surface water resources at the base were studied. Ground water occurs in open spaces in soil and rock called voids. These voids provide conduits for surface water to infiltrate into the ground and also provide space for the storage of water. Surface water occurs in drainage ditches and in streams.

Ground-Water Resources

There are two major aquifers underlying BAFB (see Table 3.3). These aquifers are sands within the Quaternary deposits and sands within the lower part of the Wilcox formation. The Quaternary deposits and Wilcox formation are separated by approximately 800 feet of interbedded sands and clays that are the Claiborne group. Irrigation wells and rural residences generally obtain water from the Quaternary sands while municipal supply wells generally obtain water from the Wilcox formation (Ryling, 1960).

The Quaternary deposits are of particular interest in this study. A primary target for subsurface contamination resulting from past practices on the base would be ground water in these deposits. The 800-foot thickness of interbedded sands and clays between the base of the Quaternary sands and the Wilcox formation protects the Wilcox from contamination.

The Quaternary deposits at the base are composed of sandy clay, clay, sand and gravel. The sandy clay and clay occur in the upper part of the Quaternary deposits while the remainder of the deposits are generally sand and gravel. The sands and gravels are the major source for water in the Quaternary deposits. The composition of the Quaternary deposits in the vicinity of the base are shown in Figure 3.5.

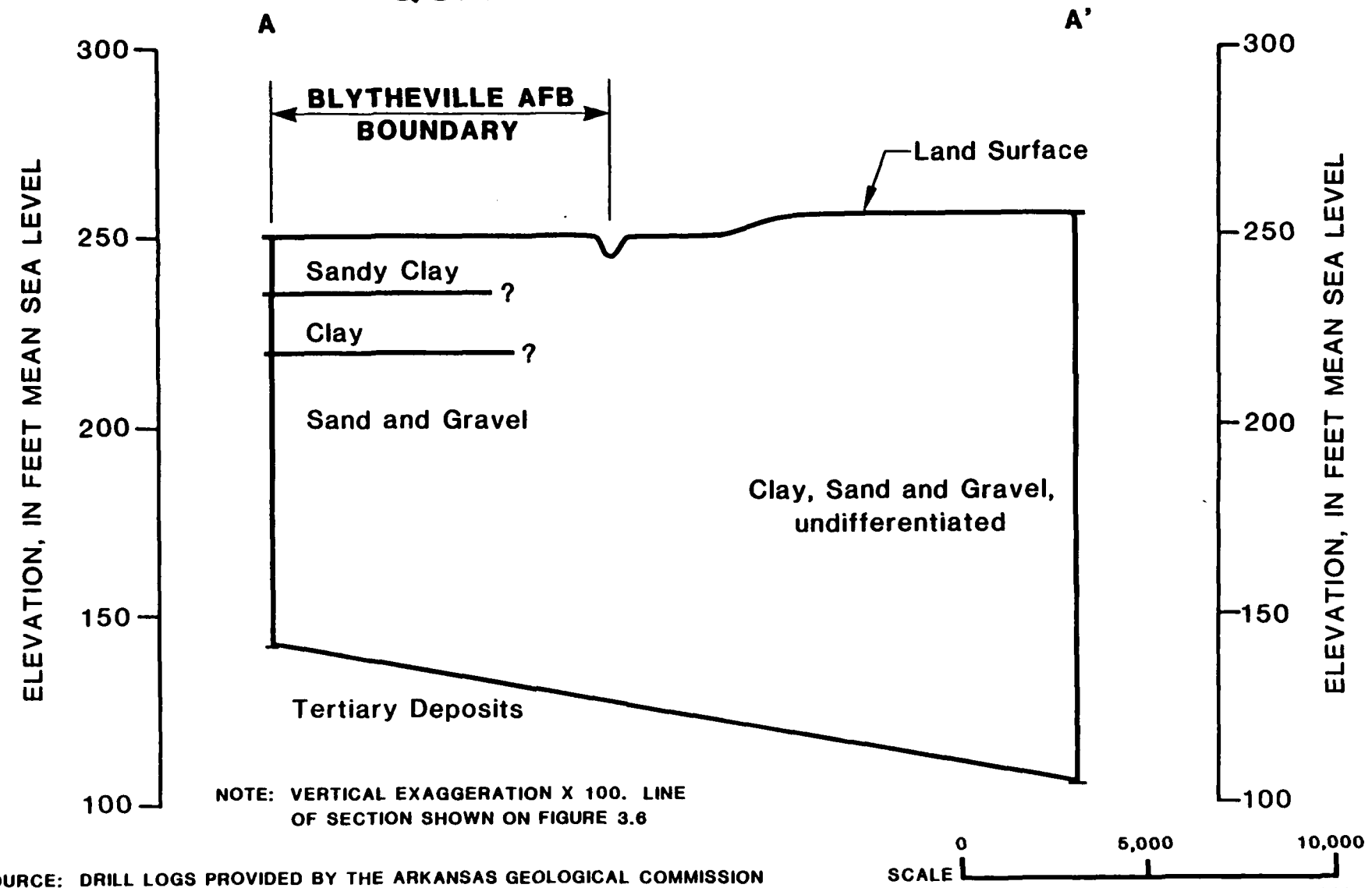
TABLE 3.3
GENERALIZED STRATIGRAPHY IN THE VICINITY OF
BLYTHEVILLE AIR FORCE BASE

System	Group or Formation	Approximate Thickness (Feet)	Dominant Lithology	Water Bearing Characteristics
Quaternary	Undifferentiated	125	Sandy clay, clay, sand and gravel	Most productive aquifer in the county.
Tertiary	Claiborne Group	800	Interbedded sand and clay Lignitic	Potential source for ground water.
	Wilcox Formation	475	Sand in lower part and clay in upper part	Second most productive aquifer in the county.
	Midway Group	600	Clay	Not an aquifer.
Cretaceous	Undifferentiated	650	Sand	Potential source for ground water.
Ordovician	Undifferentiated	1,500	Limestone	Possibly suitable for some industrial uses. Water is highly mineralized.
Cambrian	Undifferentiated	200	Dolomite	
Precambrian			Presence unknown	

Source: Ryling, 1960.

BLYTHEVILLE AFB

GENERALIZED STRATIGRAPHY OF QUATERNARY DEPOSITS



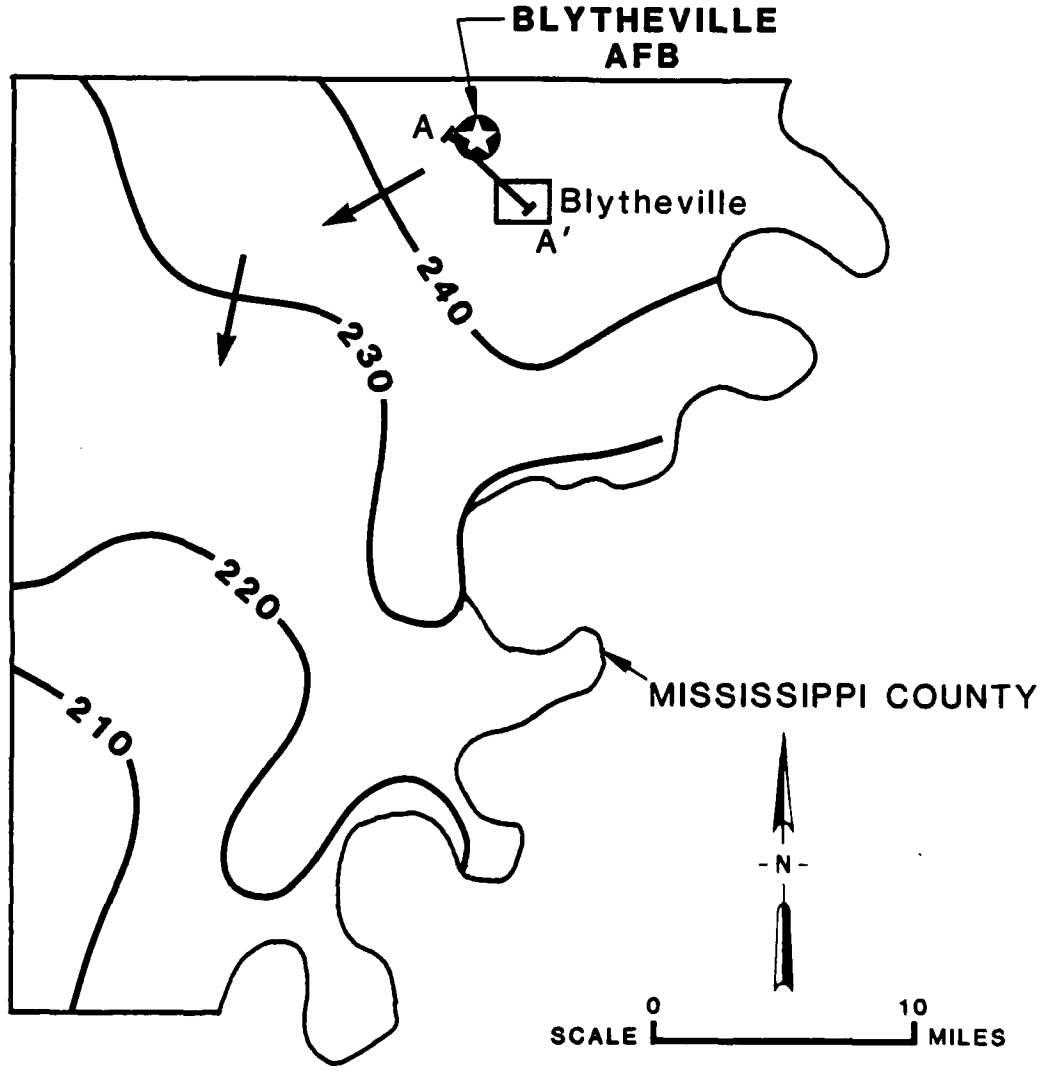
NOTE: VERTICAL EXAGGERATION X 100. LINE OF SECTION SHOWN ON FIGURE 3.6

SOURCE: DRILL LOGS PROVIDED BY THE ARKANSAS GEOLOGICAL COMMISSION

FIGURE 3.5

BLYTHEVILLE AFB

WATER TABLE CONFIGURATION



LEGEND

— 240 — WATER TABLE CONTOUR. SHOWS ALTITUDE OF THE WATER TABLE DURING THE SPRING OF 1983. CONTOUR INTERVAL 10 FEET. DATUM IS MEAN SEA LEVEL.

→ GENERALIZED DIRECTION OF GROUND-WATER FLOW IN THE QUATERNARY DEPOSITS.

A — A' APPROXIMATE LOCATION OF SECTION SHOWN ON FIGURE 3.5.

SOURCE: FROM EDDS AND FITZPATRICK, 1984

The water table depicts the upper limit of the aquifer system. The water table was at an elevation of about 240 feet mean sea level in the spring of 1983 (Figure 3.6), or 10 to 15 feet below land surface in the vicinity of the base. The water table occurs in the Quaternary deposits.

Water levels in the vicinity of the on-base landfill were 15 to 17 feet below land surface between July, 1984 and February, 1985 (Figure 3.7). This information is based on weekly water-level measurements taken at an observation well located within the landfill boundaries (BAFB documents).

The water table is highest in the area northeast of the base, indicating that that is an area of recharge to the Quaternary sands and gravels. This water flows through these deposits under the base in a general southwest to south direction (see Figure 3.6). Recharge is by precipitation.

Recharge to the Quaternary sand and gravel at the base is probably minimal, as is the potential for the downward migration of contaminants. Approximately 30 feet of relatively impermeable sandy clay and clay overlie the sand and gravel at the base.

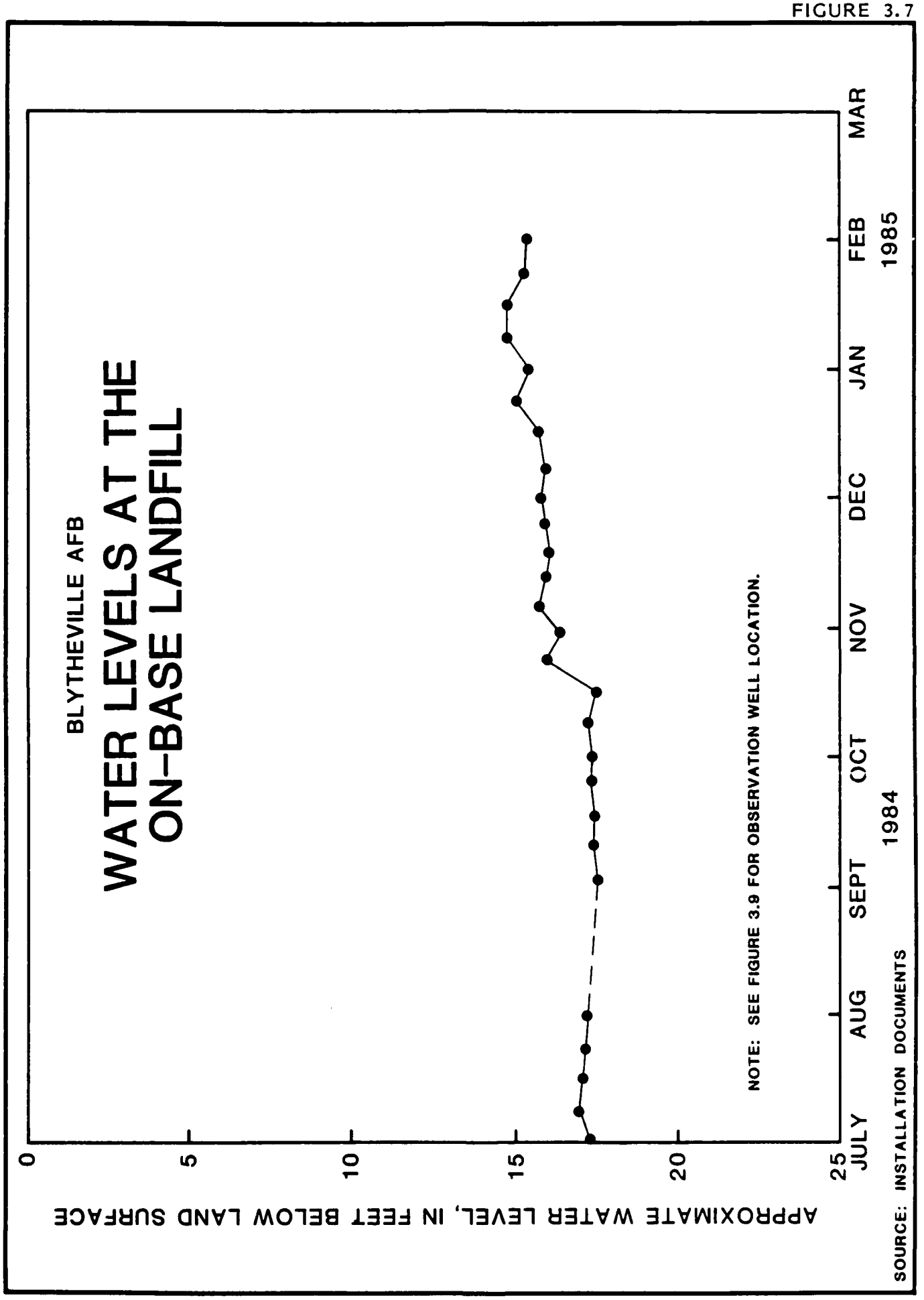
Surface Water Resources

Blytheville Air Force Base is drained by a combination of open channels and drainage structures that discharge either to Ditch No. 25 at the north end of the base or Pemiscot Bayou located along the east boundary of the base (see Figure 3.3). Both Ditch No. 25 and Pemiscot Bayou drain into the Little River. The Little River, in turn, discharges into the St. Frances River which discharges into the Mississippi River (see Figure 3.1).

Most water draining to Ditch No. 25 in the base vicinity originates on-base while water draining to Pemiscot Bayou originates from drainage east of the base as well as from the base itself.

The potential for flooding at the base is minimal. A small area along Pemiscot Bayou and a small area along an unnamed tributary to Ditch No. 25 at the north end of the base are subject to inundation from a 100-year flood event (U.S. Dept. of Housing and Urban Development (HUD), Sept. 21, 1982). The remainder of the base lies above the level

FIGURE 3.7


BLYTHEVILLE AFB
WATER LEVELS AT THE ON-BASE LANDFILL
APPROXIMATE WATER LEVEL, IN FEET BELOW LAND SURFACE
0
5
10
15
20
25
JULY
AUG
SEPT
OCT
NOV
DEC
JAN
FEB
MAR
1984
1985
NOTE: SEE FIGURE 3.9 FOR OBSERVATION WELL LOCATION.
SOURCE: INSTALLATION DOCUMENTS

of the 100-year floodplain. The areas affected by the 100-year flood are shown in Figure 3.8.

WATER USE

BAFB receives its potable water supply from two deep wells (Figure 3.9). These wells, referred to as the East and West wells, are located on the southwest side of the base. Both wells are drilled to a depth of 1,310 feet and thus receive water from the Wilcox formation (BAFB documents). Well construction details for these wells could not be found in the available BAFB documents or in the offices of the Arkansas Geological Commission.

A shallow supply well is located at the golf course clubhouse near the east base boundary (Figure 3.9). This well is used for non-potable purposes. The well probably withdraws water from the Quaternary deposits.

Three communities in the immediate vicinity of BAFB receive their water supply from deep wells (Robert White, Blytheville Waterworks Manager, Oral Comm., 1985). Gosnell receives its water from two wells located immediately west of the base. Yarbro, located about 1.5 miles northeast of the base, receives its water supply from one deep well. The City of Blytheville receives its supply from four deep wells located about 2.3 miles southeast of the base. A search of the well log files of the Arkansas Geological Commission did not identify additional wells in the area. The location of known wells in the vicinity of the base is shown on Figure 3.9.

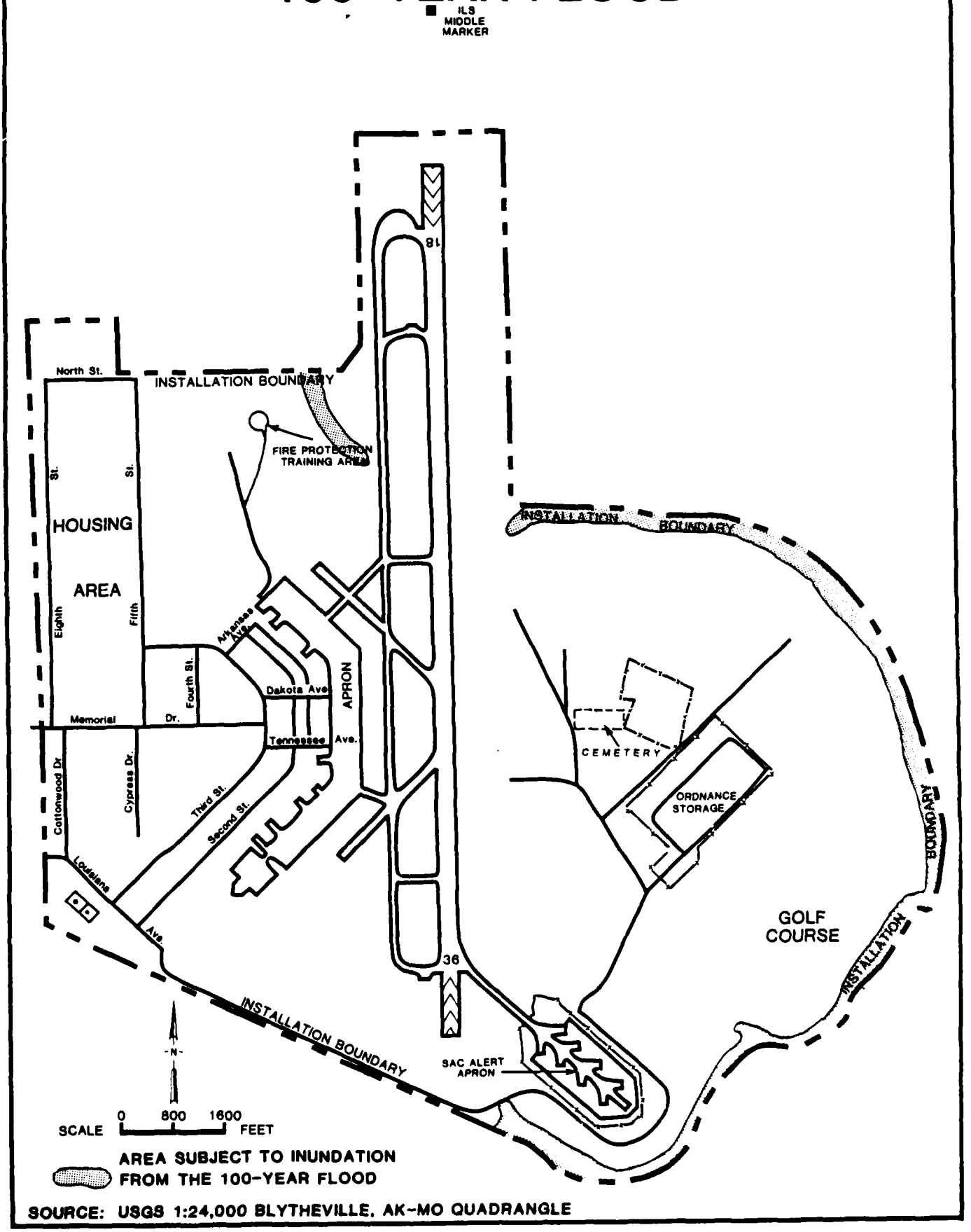
WATER QUALITY

Surface water quality is monitored at three locations on the base. Water in Ditch No. 25 is monitored at a point in the ditch where water leaves the base. Water from Pemiscot Bayou is monitored in the vicinity of the golf course club house and further downstream at the highway 151 bridge. The location of these monitoring sites is shown on Figure 3.10. The results of selected chemical analyses for water samples taken at these sites from 1980 to 1984 are summarized in Table D.3.

Runoff from the area west of the runway generally drains to Ditch No. 25. This area includes the main base area and part of the flight

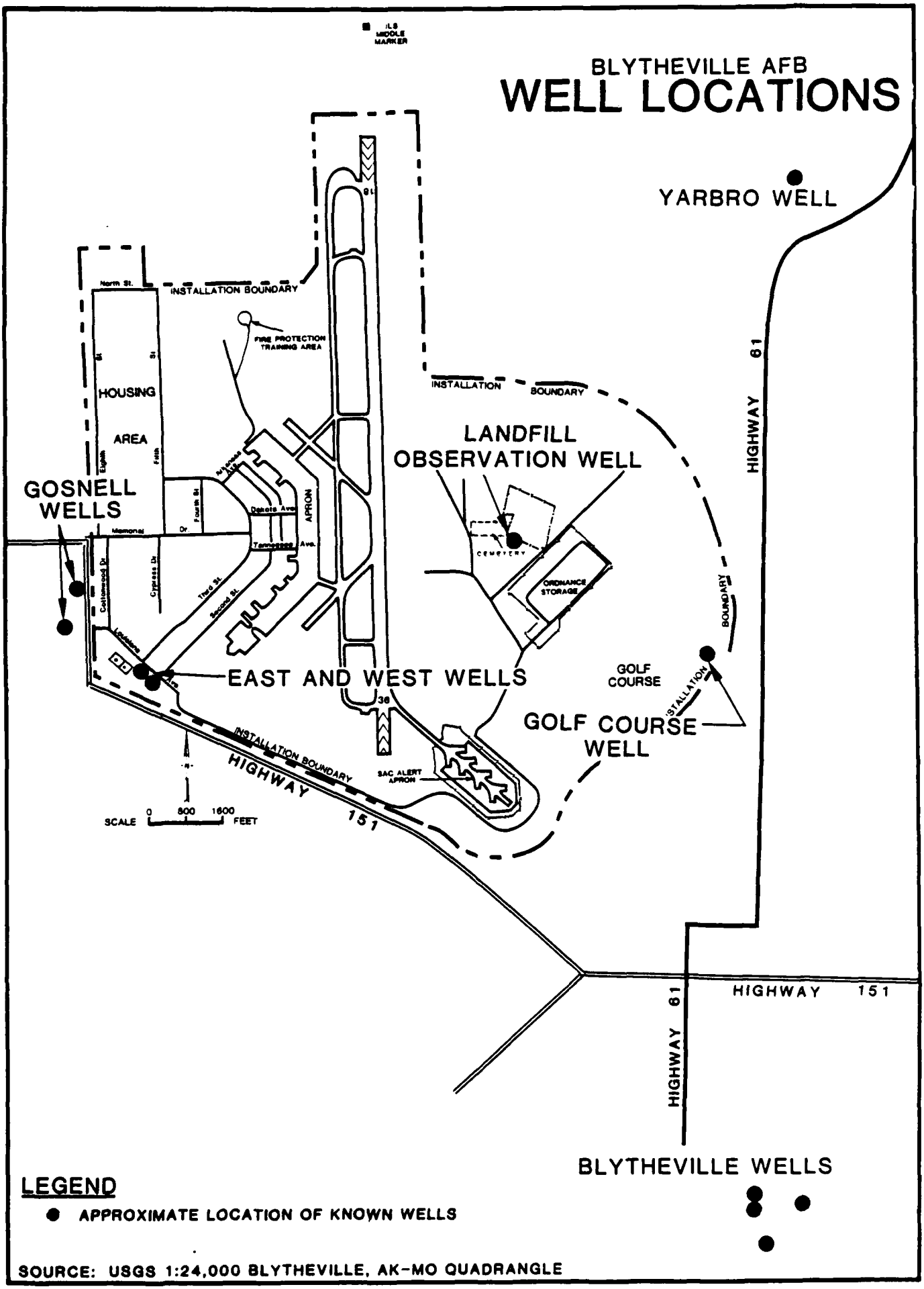
BLYTHEVILLE AFB

AREA INUNDATED BY THE 100-YEAR FLOOD



SOURCE: USGS 1:24,000 BLYTHEVILLE, AK-MO QUADRANGLE

FIGURE 3.9



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line. The monitoring site on Ditch No. 25 is used to appraise the chemical quality of runoff from that area.

Runoff from the area east of the runway generally drains to Pemiscot Bayou. This area includes the sanitary landfill area, the ordnance storage area, the golf course area and the alert facility. The monitoring site on Pemiscot Bayou at the highway 151 bridge is used to appraise the chemical quality of runoff from these combined areas. The monitoring site adjacent to the golf course is used in conjunction with the highway bridge site to appraise the impact of the alert facility on the chemical quality of runoff to Pemiscot Bayou.

BAFB discharges wastewater from its treatment plant to Pemiscot Bayou about 0.5 miles south of the base (see Figure 3.10). This discharge is permitted under the National Pollutant Discharge Elimination System (NPDES). Wastewater discharged from the plant has been in compliance with permit requirements (John Ward, Arkansas Dept. of Pollution Control and Ecology, Oral Comm., 1985).

Results of water sample analyses indicates that the quality of runoff from the base as represented by the three stream sampling sites is similar. The chemical quality of water from Pemiscot Bayou in the vicinity of the golf course appears similar to that which occurs at the highway 151 bridge. Also, the chemical quality of water from Ditch No. 25 appears similar to that in Pemiscot Bayou (Table D.3).

Wastewater discharged to Pemiscot Bayou is slightly different in chemical quality than water from Pemiscot Bayou (see Table D.3). The nitrate, chloride and phosphorus contents in the wastewater are generally higher than those in water from the bayou. Other chemical parameters analyzed in the wastewater are similar to those found in Pemiscot Bayou.

Raw groundwater from the East and West wells is of generally good quality (Table 3.5). Most chemical parameters analyzed in water from these wells are within acceptable limits. The pH of the water is slightly below Secondary Drinking Water Standards in both wells and the phenol concentration in the west well is slightly elevated (0.098 mg/L). The source of the phenol in the west well is unknown.

FIGURE 3.10

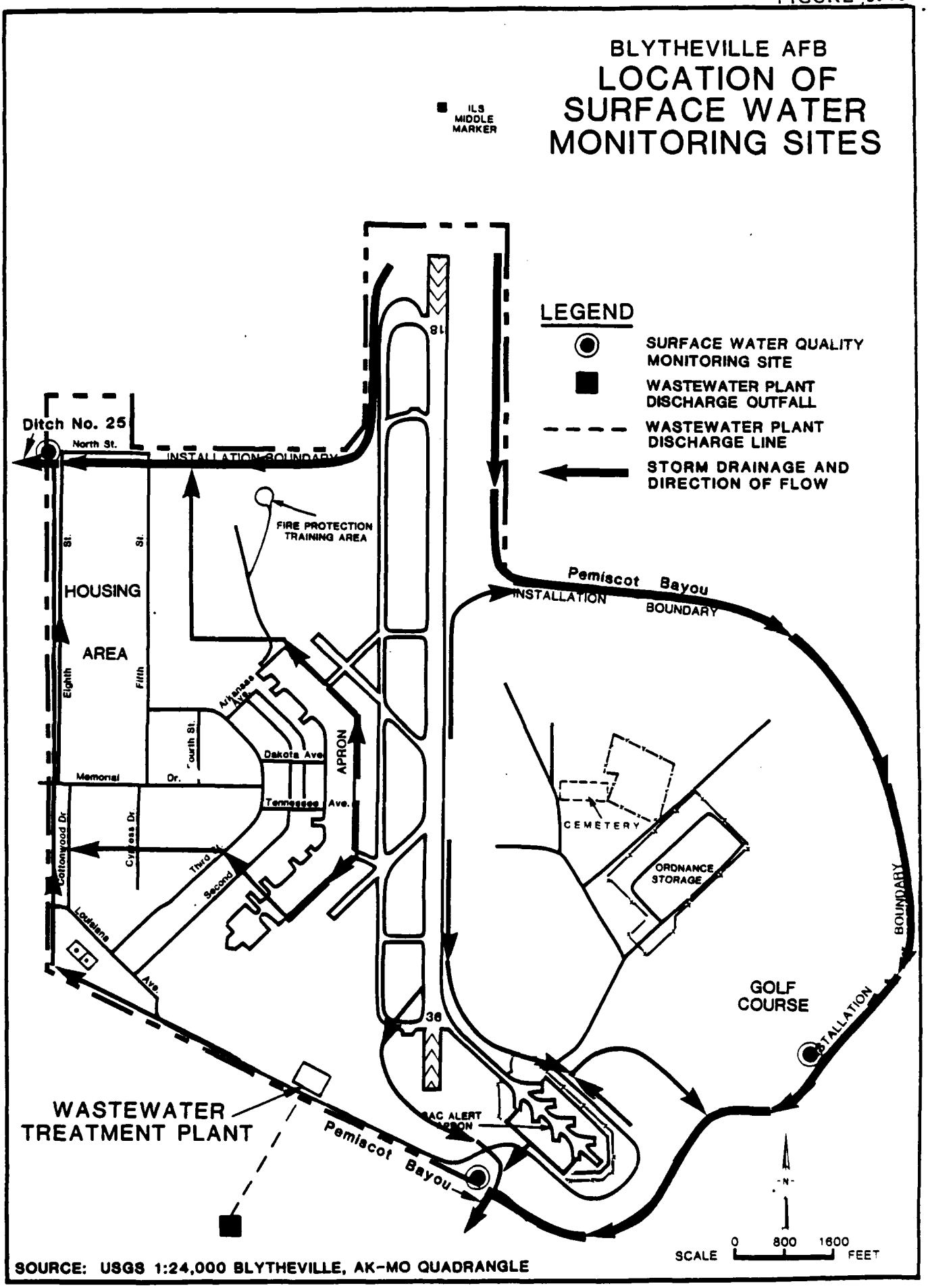

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TABLE 3.4

SUMMARY OF CHEMICAL ANALYSES FOR BASE WATER SUPPLY WELLS, FEBRUARY, 1983 (1)
(All analyses in milligrams per liter unless otherwise noted)

Constituent	East Well	West Well	Drinking Water Standard (2)
pH (std. units)	6.0	6.0	(6.5 - 8.5)
Nitrate	0.1	0.1	10
Orthophosphate	0.23	0.23	None
Organophosphorous	0.07	0.01	None
Polyphosphate	0.01	0.01	None
Phenol	0.01	0.098	None
Alkalinity, total as $CaCO_3$	78	80	None
Carbon dioxide	130	160	None
Chloride	1.0	1.0	(250)
Total dissolved solids	108	109	(500)
Silica, dissolved	11.2	11.2	None
Specific conductance (umhos/centimeter)	155	155	None
Endrin	<0.00002	<0.00002	<0.00002
Lindane	<0.00001	<0.00001	<0.004
Methoxychlor	<0.0002	<0.0002	<0.1
Toxaphene	<0.001	<0.001	<0.005
2,4-D	<0.00006	<0.00006	<0.1
2,4,5-TP Silvex	<0.00006	<0.00006	<0.01

(1) From BAFB Documents
(2) Secondary drinking water standards are in parentheses. None means no standard is set for this parameter.

Raw water from the wells is treated prior to being distributed. Treatment consists of aeration, followed by coagulation with lime, sedimentation, filtration and chlorination (BAFB documents).

THREATENED AND ENDANGERED SPECIES

There are no known species of threatened or endangered plants or animals in residence at Blytheville AFB. This may be due to the fact that most of the installation's land area has been disturbed by developmental activities over the years as the base's mission was changed or expanded. Such site use modifications may have inadvertently disrupted habitats that could have been utilized by resident or transient species. Much of the land area surrounding the base has similarly been altered by intensive agricultural activities that have occurred in the region during most of this century.

SUMMARY OF ENVIRONMENTAL SETTING

The environmental setting data reviewed for this investigation identified the following major points that are relevant to BAFB.

- There is some potential for degrading the quality of ground water underlying the base. Net precipitation, an indicator for the potential of leachate generation resulting from rainfall, is moderate. However, the poor infiltration characteristics of most soils on the base, coupled with the occurence of relatively impermeable sandy clay and clay near land surface, aids in minimizing this potential.
- There is probably a good potential for the off-base transport of surface contaminants. The one-year, 24-hour rainfall event, which is used to aid in judging the potential for erosion and runoff, is high. Most of the soils on the base have poor infiltration characteristics, which also promotes runoff. However, the land slopes on the base are gentle. This fact tends to partially offset the effects of high rainfall intensity and poor soil infiltration characteristics for transporting contaminants.

- Two aquifers underlying BAFB are used for water supply. Sands and gravels at depths 30 to 100 feet below land surface are used as a source of water supply by rural residences and as a source of water for irrigation. Sands within the Wilcox formation at a depth of 1,300 to 1,400 feet are used as a source of water supply for the base and for municipalities in the base vicinity. These aquifers are separated by an 800-foot thickness of interbedded sands and clays.
- The base receives its potable water supply from two wells completed in the Wilcox formation. Nearby municipalities also receive their water supply from the Wilcox formation. The water quality from the base wells is generally good.
- Flooding potential at the base is minimal. Most of the base lies above the limits of the 100-year flood event.
- Runoff from the base does not appear to adversely impact the quality of nearby surface waters. This conclusion is based on semi-annual sampling of runoff waters from the base.
- There are no known species of threatened or endangered plants or animals in residence at Blytheville AFB.

SECTION 4
FINDINGS

This section summarizes the hazardous wastes generated by installation activities, identifies hazardous waste accumulation and disposal sites located on the installation, and evaluates the potential environmental contamination from hazardous waste sites. Past waste generation and disposal methods were reviewed to assess hazardous waste management practices at Blytheville AFB.

INSTALLATION HAZARDOUS WASTE ACTIVITY REVIEW

A review was made of past and present installation activities that resulted in generation, accumulation and disposal of hazardous wastes. Information was obtained from files and records, interviews with past and present installation employees and site inspections.

The sources of hazardous waste at Blytheville AFB are grouped into the following categories:

- Industrial Operations (Shops)
- Waste Accumulation and Storage Areas
- Fuels Management
- Spills and Leaks
- Pesticide Utilization
- Fire Protection Training

The subsequent discussion addresses only those wastes generated at Blytheville AFB which are either hazardous or potentially hazardous. Potentially hazardous wastes are grouped with and referenced as "hazardous wastes" throughout this report. A hazardous waste, for this report, is defined by, but not limited to, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). CERCLA incorporates the hazardous materials and wastes identified under the Resource Conservation and Recovery Act (RCRA), the Toxic Substances

Control Act (TSCA), and other Federal legislation. For study purposes, waste petroleum products such as contaminated fuels, waste oils and waste solvents are also included in the "hazardous waste" category.

No distinction is made in this report between "hazardous substances/materials" and "hazardous wastes". A potentially hazardous waste is one which is suspected of being hazardous although insufficient data are available to fully characterize the material.

Industrial Operations (Shops)

Summaries of industrial operations at Blytheville AFB were developed from installation files and interviews. Information obtained was used to determine which operations handle hazardous materials and which ones generate hazardous wastes. Summary information on all installation shops is provided as Appendix E, Master List of Shops.

Industrial operations at Blytheville AFB were grouped into twelve main units:

- 97 Field Maintenance Squadron
- 97 Organizational Maintenance Squadron
- 97 Civil Engineering Squadron
- 97 Munitions Maintenance Squadron
- 2101 Communications
- 97 Transportation
- 97 Supply Squadron
- 97 Combat Support Group
- 97 Consolidated Headquarters Squadron
- USAF Hospital
- 97 Bombardment Wing
- 97 Avionics Maintenance Squadron

Bioenvironmental Engineering Section (BES) provided a listing of industrial shops as well as individual shop files indicating waste generation and disposal practices. For the shops identified as generating hazardous wastes, file data were reviewed and personnel were interviewed to determine the types and quantities of materials and present and past disposal methods. Information developed from base files and interviews with installation employees is summarized in Table 4.1.

TABLE 4.1

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
97 FIELD MAINTENANCE SQUADRON				
ACCESSORY REPAIR	105	AIRCRAFT ENGINE OIL	110 GALS./YR.	1955 FPTA 1972 TANKS DPDO 1983
		PD 680 & FINGERPRINT REMOVER	1,000 GALS./YR.	FPTA TANKS DPDO
		CARBON REMOVER	55 GALS./YR.	FPTA TANKS DPDO
AEROSPACE GROUND EQUIPMENT	203	OIL & FUEL	1,000 GALS./YR.	1954 FPTA TANKS
		HYDRAULIC FLUID	2 GALS./YR.	1955 FPTA TANKS
		PD 680	660 GALS./YR.	OIL/WATER SEPARATOR TO SANITARY SEWER SANITARY SEWER 1983
		PD 680	80 GALS./YR.	FPTA 1972 TANKS
WHEEL AND TIRE	207	PD 680	165 GALS./YR.	OIL/WATER SEPARATOR TO SANITARY SEWER SANITARY SEWER 1979
ELECTRIC SHOP	215	SULFURIC ACID FROM LEAD ACID BATTERIES	120 GALS./YR.	1956 NEUTRALIZED TO SANITARY SEWER DPDO 1982
		POTASSIUM HYDROXIDE FROM NICKEL CADMIUM BATTERIES	300 GALS./YR.	NEUTRALIZED TO SANITARY SEWER DPDO
PNEUDRAULICS	215	PD 680	330 GALS./YR.	FPTA 1972 TANKS
		HYDRAULIC FLUID	12 GALS./YR.	FPTA TANKS

KEY

———— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME FRAME DATA

DPDO DEFENSE PROPERTY DISPOSAL OFFICE

FPTA FIRE PROTECTION TRAINING AREA

TANKS UNDERGROUND WASTE OIL TANKS, TO CONTRACT DISPOSAL OFF-BASE

DRUMS STORAGE AREA IN PACK OF BLDG. 457

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 · 1960 · 1970 · 1980)
NON DESTRUCTIVE INSPECTION	449	PENETRANT	110 GALS./YR.	1955 SANITARY SEWER → 1979 DPDO
		PD-680	100 GALS./YR.	1982 SANITARY SEWER → DPDO
		X-RAY FIXER	10 GALS./YR.	SANITARY SEWER → PHOTO LAB FOR SILVER RECOVERY
		EMULSIFIER	110 GALS./YR.	SANITARY SEWER → 1979 DPDO
CORROSION CONTROL	455	PD 680	480 GALS./YR.	OIL/WATER SEPARATOR TO SANITARY SEWER → SANITARY SEWER
		ALKALINE & DEGREASER SOAPS	5,300 GALS./YR.	1959 1975 OIL/WATER SEPARATOR TO SANITARY SEWER → SANITARY SEWER
		PAINT STRIPPER RESIDUES	825 GALS./YR.	OIL/WATER SEPARATOR TO SANITARY SEWER → SANITARY SEWER
		PAINT THINNER	60 GALS./YR.	OIL/WATER SEPARATOR TO SANITARY SEWER → SANITARY SEWER
		CHROMIC ACID	5 GALS./YR.	OIL/WATER SEPARATOR TO SANITARY SEWER → SANITARY SEWER
		PHOSPHORIC ACID	24 GALS./YR.	OIL/WATER SEPARATOR TO SANITARY SEWER → SANITARY SEWER
		MIXED PAINTS & THINNERS	220 GALS./YR.	FPTA → 1972 TANKS → DPDO 1982
FUEL CELL REPAIR	457	OIL, GREASE & FUEL	24 GALS./YR.	1955 FPTA → DRUMS
		JP 4	5,000 GALS./YR.	FPTA → RECLAIMED
TEST CELL	1303	WASTE OIL & FUEL	12 GALS./YR.	1960 SANITARY SEWER →

KEY

———— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME FRAME DATA

DPDO DEFENSE PROPERTY DISPOSAL OFFICE

FPTA FIRE PROTECTION TRAINING AREA

TANKS UNDERGROUND WASTE OIL TANKS, TO CONTRACT DISPOSAL OFF-BASE

DRUMS STORAGE AREA IN BACK OF BLDG. 457

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
97 ORGANIZATIONAL MAINTENANCE SQUADRON				
NON POWERED AGE	106	PD-680	540 GALS./YR.	OIL/WATER SEPARATOR TO SANITARY SEWER; 1954 SANITARY SEWER 1982
		HYDRAULIC FLUID	140 GALS./YR.	FPTA 1972 TANKS
		SODIUM HYDROXIDE	15 GALS./YR.	DILUTED AND RELEASED TO SANITARY SEWER 1983
		PD 680	180 GALS./YR.	FPTA 1972 TANKS
97 CIVIL ENGINEERING SQUADRON				
FIRE VEHICLE MAINTENANCE	100	PD 680	50 GALS./YR.	1955 FPTA 1972 TANKS
		MOTOR OIL	120 GALS./YR.	FPTA TANKS
		DIESEL FUEL	50 GALS./YR.	FPTA TANKS
LIQUID FUELS MAINTENANCE	470	TANK SLUDGES	30 GALS./3 YRS.	CONTRACT DISPOSAL OFF BASE; TANKS WEATHERED AND BURIED IN TANK FARM 1978
		OILY SLUDGES FROM OIL/ WATER SEPARATORS	APPROXIMATELY 10,000 GALS./YR.	FPTA 1972 TANKS
POWER PRODUCTION	471	OIL	300 GALS./YR.	FPTA TANKS
PAVEMENT AND GROUNDS	471, 473	OIL & DIESEL	12 GALS./YR.	FPTA TANKS

KEY

———— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME FRAME DATA

DPDO DEFENSE PROPERTY DISPOSAL OFFICE

FPTA FIRE PROTECTION TRAINING AREA

TANKS UNDERGROUND WASTE OIL TANKS, TO CONTRACT DISPOSAL OFF-BASE

DRUMS STORAGE AREA IN BACK OF BLDG. 457

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
ENTOMOLOGY	1003, 1014	EMPTY PESTICIDE CONTAINERS	200 CONTAINERS/YR.	TRIPLE RINSE & DISPOSE IN SANITARY LANDFILL 1969 →
		DISCARDED PESTICIDE BAGS	10 BAGS/YR.	SANITARY LANDFILL →
97 MUNITIONS MAINTENANCE SQUADRON				
NUCLEAR WEAPONS MAINTENANCE	1213 (WAS 1212)	PAINT & PRIMER THINNERS	10 GALS./YR.	TANKS FPTA 1980 1982 →
VACE	1285	LUBE OIL	2 GALS./YR.	1977 TANKS →
MISSILE CHECKOUT	1285	PF1-PRIMING FUEL	6 GALS./YR.	1958 RECLAIMED BY FUELS LAB →
EQUIPMENT MAINTENANCE	1288 (WAS 105)	HYDRAULIC FLUID	220 GALS./YR.	FPTA → TANKS →
		PD-680	110 GALS./YR.	FPTA → TANKS →
97 TRANSPORTATION SQUADRON				
FUEL VEHICLE MAINTENANCE	467	JP-4	5,000 GALS./YR.	1955 RECLAIMED OFF-BASE →
		ENGINE OIL	110 GALS./YR.	FPTA → 1972 TANKS →
		SPILLED OIL, SOAP, ETC.	100 GALS./YR.	OIL/WATER TO SANITARY SEWER →

KEY

———— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME-FRAME DATA

DPDO DEFENSE PROPERTY DISPOSAL OFFICE

FPTA FIRE PROTECTION TRAINING AREA

TANKS UNDERGROUND WASTE OIL TANKS, TO CONTRACT DISPOSAL OFF-BASE

DRUMS STORAGE AREA IN BACK OF BLDG. 457

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 / 1960 / 1970 / 1980)
GENERAL VEHICLE MAINTENANCE	468	PD-680	240 GALS./YR.	1955 FPTA → 1972 TANKS
		SULFURIC ACID (IN OLD BATTERIES)	420 GALS./YR.	NEUTRALIZED TO SANITARY SEWER → DPDO 1984
		ETHYLENE GLYCOL	500 GALS./YR.	SANITARY SEWER
		PAINTS	12 GALS./YR.	FPTA → TANKS
		PAINT THINNERS	30 GALS./YR.	FPTA → TANKS
		TRANSMISSION & BRAKE FLUID	24 GALS./YR.	FPTA → TANKS
		DIESEL, MOGAS, OIL	APPROXIMATELY 8,000 GALS./YR.	FPTA → TANKS
SUPPLY				
FUELS LAB	498	JP-4 FROM PUMPHOUSE SLOP TANKS	1,200 GALS./YR.	FPTA → TANKS
		JP-4 FROM BULK STORAGE AREA SLOP TANKS	1,000 GALS./YR.	FPTA → TANKS
		ACID	2 GALS./YR.	1958 SANITARY SEWER → RECYCLED
		JP-4 FUEL SAMPLES	2,350 GALS./YR.	FPTA → RECLAIMED
		JP-4 FROM REFUELING UNITS	50 GALS./YR.	FPTA → RECLAIMED
97 COMBAT SUPPORT GROUP				
PHOTO LAB	150	FIXER	50 GALS./YR.	1955 SANITARY SEWER → SILVER RECOVERY TO SANITARY SEWER
		DEVELOPER	100 GALS./YR.	SANITARY SEWER
AUTO HOBBY SHOP	237	FUELS, OILS, SOLVENTS	5,000 GALS./YR.	CONTRACT DISPOSAL OFF BASE 1969 → 1982

KEY

———— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME-FRAME DATA

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TANKS - UNDERGROUND WASTE OIL TANKS, TO CONTRACT DISPOSAL OFF-BASE

DRUMS - STORAGE AREA IN BACK OF BLDG. 457

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL 1950 1960 1970 1980
USAF HOSPITAL				
DENTAL LAB	234	GOLD PLATING SOLUTION	1 LB./YR.	1955 SANITARY SEWER → GOLD RECOVERY TO DPDO 1970
DENTAL CLINIC	234	DEVELOPER	12 GALS./YR.	SANITARY SEWER →
		FIXER	12 GALS./YR.	SILVER RECOVERY TO DPDO; SILVER RECOVERY TO SANITARY SEWER → 1984
MEDICAL X RAY	650	FIXER & DEVELOPER	480 GALS./YR.	SILVER RECOVERY TO SANITARY SEWER; SANITARY SEWER 1958 → 1975
97 AVIONICS MAINTENANCE SQUADRON				
DEFENSE AND FIRE CONTROL	130	PERCHLOROETHYLENE	440 GALS./YR.	DPDO → 1984
		TRICHLOROETHYLENE	330 GALS./YR.	FPTA 1955 → 1975 DPDO
		OIL	50 GALS./YR.	FPTA → DPDO
		PD 680	165 GALS./YR.	FPTA → DPDO

KEY

———— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME FRAME DATA

DPDO DEFENSE PROPERTY DISPOSAL OFFICE

FPTA FIRE PROTECTION TRAINING AREA

TANKS UNDERGROUND WASTE OIL TANKS, TO CONTRACT DISPOSAL OFF-BASE

DRUMS STORAGE AREA IN BACK OF BLDG. 457

Most shops were established in 1955-1958, during the period of base reactivation. Hazardous materials were generated from the onset of shop activities; however, due to the low proportion of long-term shop employees, little information is available regarding the quantities and disposal of these wastes prior to the late 1960's. No shop information is available for the period covered by World War II.

Wastes generated at Blytheville AFB consist primarily of contaminated jet fuel (JP-4), waste solvent (PD-680), waste oil and other petroleum products, acids, paints and paint strippers. Containers and other trash items are placed in dumpsters and transported to an on-base sanitary landfill. Occasionally, when the landfill access road was impassable due to inclement weather, trash was transported to the City of Blytheville incinerator.

Contaminated JP-4 generated by shop and fueling/defueling operations is either recycled into the bulk fuel supply system or burned/reclaimed depending on its degree of contamination. Both on-base (use in fire training exercises) and off-base (contractor) reuse are practiced.

Until very recently, waste acid and alkaline solutions were neutralized and diluted to the sanitary sewer system. Currently, these wastes (primarily sulfuric acid and potassium hydroxide contained in batteries) are sent to the Defense Property Disposal Office (DPDO) for contract disposal/reclamation off base.

From at least the early 1970's to the present, approximately half the waste solvents (primarily PD-680) generated by Blytheville AFB shop activities have been released to the sanitary sewer following pre-treatment in oil/water separators. Prior to the installation of oil/water separators, these waste solvents were discharged to the sewer without pretreatment. Other waste solvents have been collected in bowsers or small containers in the shop areas and have been transported to four underground "waste oil" tanks located in the northwestern portion of the base. Waste oil, MOGAS, diesel fuel, and other petroleum products are also held in these tanks prior to off-base reclamation. The waste oil tanks were installed in 1972 and the waste materials collected in these tanks are removed by a contractor for reuse at an off-base facility. Prior to the installation of the waste oil tanks the solvents were

taken to the fire protection training area where they were periodically burned. A small amount of waste solvents and synthetic oils have been stored in drums at the DPDO. Before 1972, it is assumed that most, if not all, of the waste oil, fuels and solvents were burned in fire training exercises.

Wastes generated by the base's Photo Lab and various X-ray processing facilities (fixer and developer) were originally discharged to the sanitary sewer system. For at least the past 15 years, spent fixer has been processed for silver recovery.

Waste Accumulation and Storage Areas

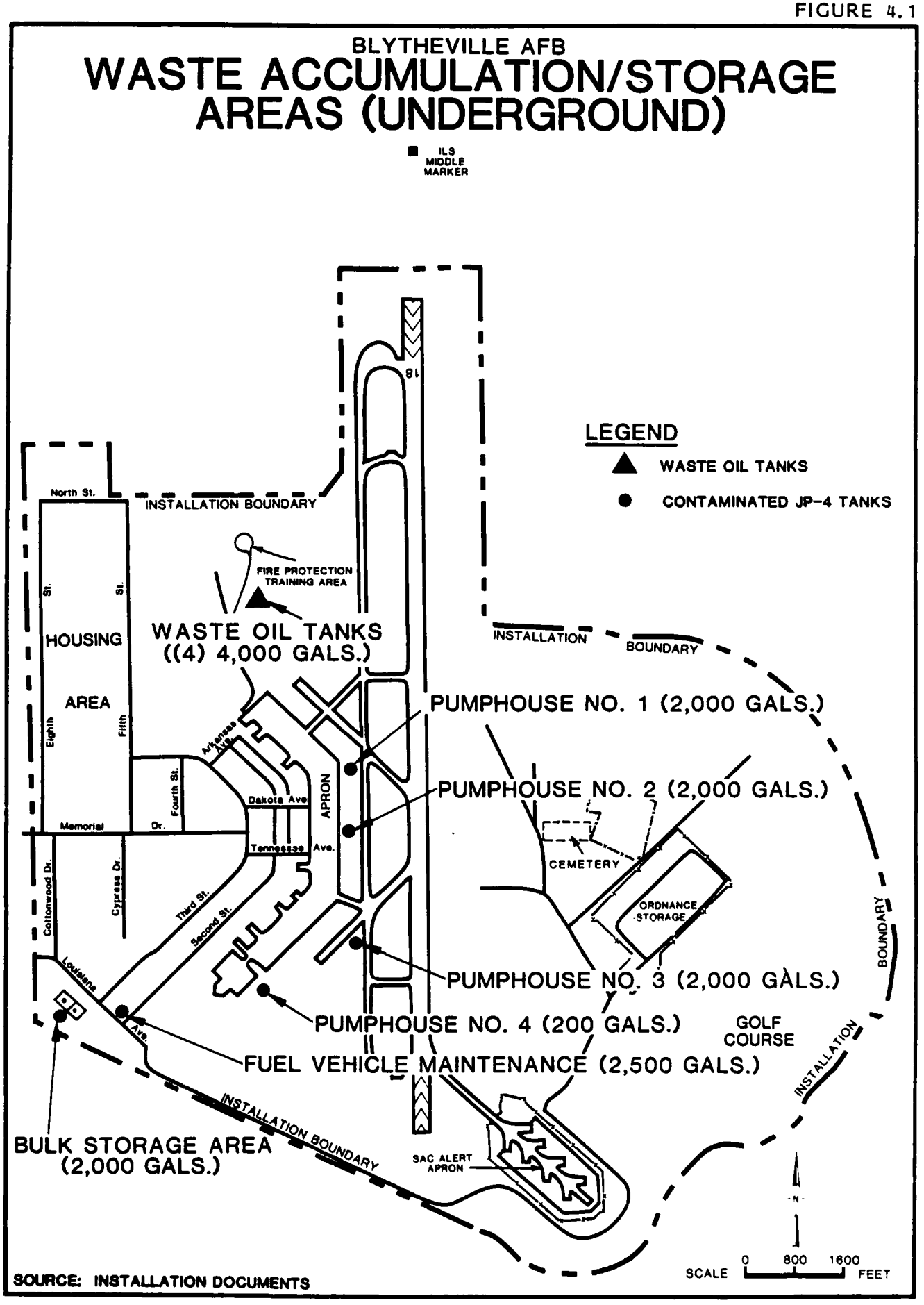
Waste petroleum, oils, and lubricantas generated by shop and fueling/defueling activities are stored at several locations on the base (see Figures 4.1 and 4.2). Typically, shops accumulate their wastes in drums or bowsers which are then emptied into the underground waste oil tanks. Additional waste storage locations include the DPDO yard, one underground tank for the storage of contaminated JP-4 and five underground tanks for accumulation of JP-4/water mixture.

The waste oil tanks have been used for accumulation of waste solvents, oils and fuel prior to removal and disposal off-base by a contractor. These four tanks are located north of the flight-line and hold 4,000 gallons each. Access to the tanks is controlled by a locked gate, and all deliveries and withdrawals are recorded in a log book. The tanks, installed in 1972, previously held diesel and Mogas at the old BX service station (now the location of the base bank), and are estimated to be approximately 25-30 years old. They are not cathodically protected. For the past five years, the ground immediately under transfer areas has been protected by a concrete pad. Adjoining areas are covered with crushed stone. The occurrence of past spills was evident from staining at the site and was confirmed by interviews with base personnel.

The Defense Property Disposal Office (DPDO) or its predecessor organization has functioned at Blytheville AFB since 1955. From 1980 to the present, drummed and bottled wastes have been segregated and stored outdoors on pallets over a concrete pad in the DPDO yard. The DPDO also stores PCB-containing and PCB-contaminated transformers. The transformers are held indoors in drip trays over a concrete floor. Access to both the DPDO warehouse (Building 426) and the drum storage area is

FIGURE 4.1

BLYTHEVILLE AFB
WASTE ACCUMULATION/STORAGE AREAS (UNDERGROUND)



SOURCE: INSTALLATION DOCUMENTS

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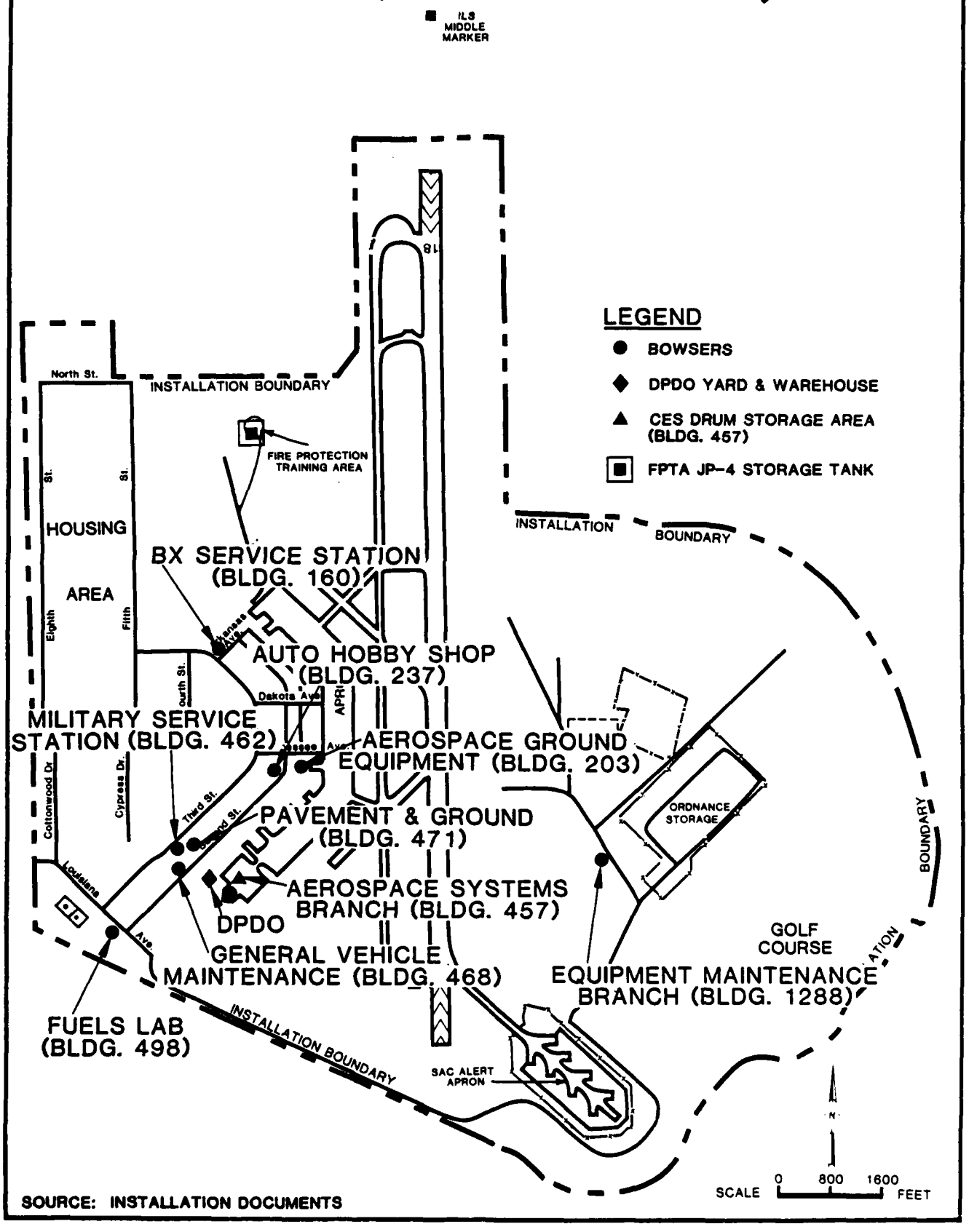
FIGURE 4.2

BLYTHEVILLE AFB
WASTE ACCUMULATION/STORAGE AREAS (ABOVE GROUND)



SOURCE: INSTALLATION DOCUMENTS

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controlled by a locked fence and locked gate. There was no evidence or report of spills in this area.

Additional underground tanks, used solely for the accumulation of contaminated JP-4, are located at Pumphouses 1 through 4 (2000, 2000, 2000, and 200 gallons, respectively); Building 467, the Fuel Vehicle Maintenance Shop (2500 gallons); and the bulk storage area (2000 gallons). Of these six tanks, only the one at Building 467 lacks cathodic protection. All contaminated JP-4 from these tanks is either held in the underground waste oil tanks prior to off-base reclamation or sent directly off-base for reclamation. There was no report or evidence of leakage from any of these tanks.

Fuels Management

From 1942 to 1946 the fuels management system at Blytheville AFB consisted of both underground AVGAS (aviation gasoline) tanks located near Buildings 401 and 402, and underground MOGAS (motor gasoline) tanks near Building 517. AVGAS was delivered to the base by rail car and tank truck, and was transferred to the flight line by tank truck. Currently these tanks are used to store diesel fuel and MOGAS.

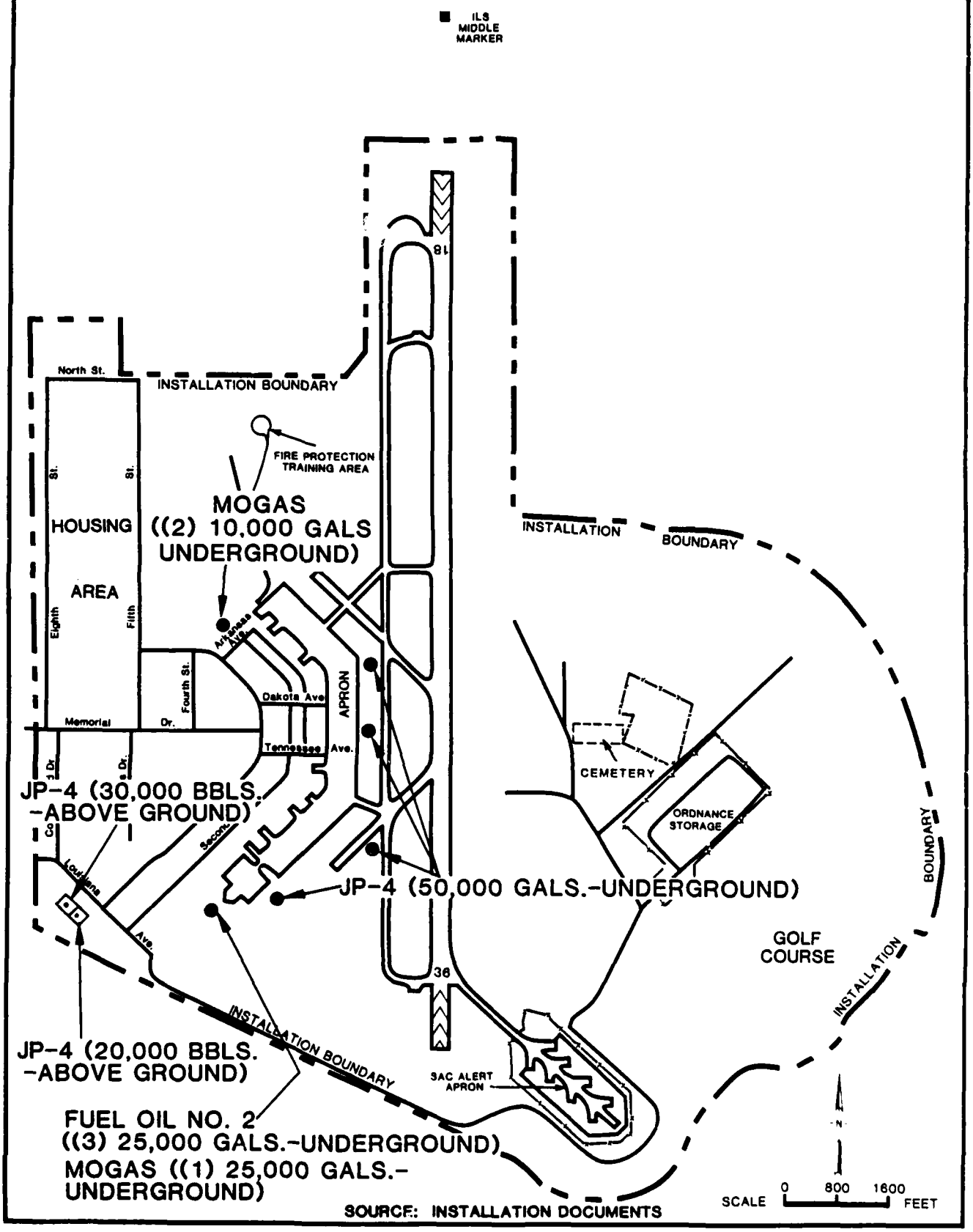
Following the reactivation of Blytheville AFB in 1955, an above ground bulk storage tank and hydrant system were constructed to hold and distribute JP-4. The capacity of this first tank is 840,000 gallons. A second above ground tank, 1.26 million gallons, was added in the late 1950's. These tanks are located in the southwest corner of the base (see Figure 4.3). Fuel was delivered to the base by rail car and tank truck up until the late 1960's, when a direct transfer line was built connecting the base with the Blytheville River-Rail Terminal.

The fuel offloading facilities, storage tanks, and fuel transfer and hydrant systems are maintained by the Civil Engineering Squadron's Liquid Fuels Maintenance Shop. In 1970 a cathodic protection system was installed to protect the pipelines and underground fuel storage tanks on base. All are periodically inspected and tanks are cleaned out every 3 to 5 years as necessary. Until the late 1970's, sludge generated by tank cleaning operations (3-5 gallons per cleaning) was weathered and buried in the bulk fuel tank farm. Now the sludge is disposed off base by a contractor. Fuel filters are sent to the sanitary landfill for disposal.

FIGURE 4.3

BLYTHEVILLE AFB

MAJOR LIQUID FUELS STORAGE AREAS



SOURCE: INSTALLATION DOCUMENTS

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Other fuels used at Blytheville AFB include propane, diesel, and No. 2 fuel oil. A listing of the fuel storage tanks, their locations, contents, capacities and type of tank (underground or above ground) is presented in Appendix D, Table D.1.

Spills And Leaks

The locations of spills that are significant to the IRP program are discussed below and shown in Figure 4.4.

Spill Sites Nos. 1 and 2

In 1973 and 1974 pressure testing indicated the presence of leaks in the JP-4 hydrant system at two separate locations. The amount of fuel lost is not known, but was estimated to be large. The lines were repaired and a small amount of JP-4 was recovered. Pressure testing of the lines is now conducted every 3 to 5 years and no further leaks have been detected.

Spill Site No. 3

In 1981, the aborted takeoff of a KC-135 tanker resulted in the loss of an unknown amount of JP-4. Following the accident, spilled fuel was collected in a pit by the taxiway and allowed to evaporate/infiltrate over a period of several days.

Spill Site No. 4

For the past 20 years, a waste oil bowser has been located outside the Auto Hobby Shop (Building 237). The occurrence of past spillage was evident from a visual inspection of the site. In March of 1985, visibly contaminanted soil was removed and sent to the base's active sanitary landfill for disposal.

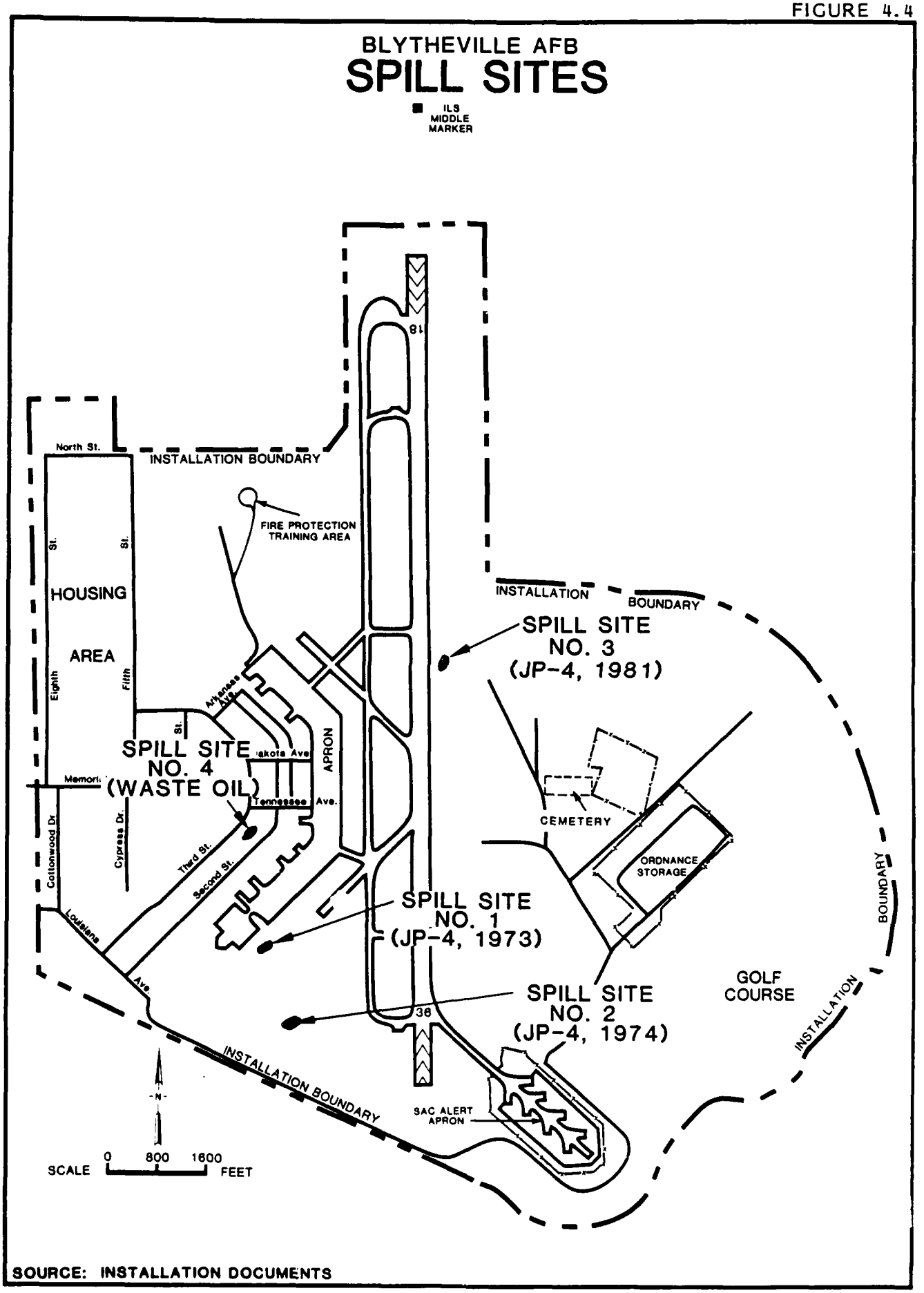
Evidence of the past occurrence of small oil and fuel spills was observed at several locations throughout the base. These small spills were primarily due to fuel transfer and aircraft refueling operations and have occurred in both paved and unpaved areas. In unpaved areas, stained soil was observed around tanks and transfer points. These spills are not considered significant due to their size and nature.

Pesticide Utilization

Pest management has been the responsibility of the Entomology Shop, currently located in Buildings 1003 & 1014, for approximately 15-20 years. Entomology personnel are responsible for control of both indoor (roaches and fleas) and outdoor (primarily mosquitoes) pests. Pesti-

FIGURE 4.4

BLYTHEVILLE AFB
SPILL SITES



SOURCE: INSTALLATION DOCUMENTS

cides and herbicides currently used are listed in Appendix D, Table D.2. Since 1984, the Entomology Shop has also conducted herbicide spraying, formerly done by Pavement and Grounds personnel (Buildings 471 & 473). Most herbicides and pesticides are stored in Building 1014, which is used primarily as a warehouse. Some small-volume compounds are stored in a separate room in Building 1003.

From 1976 to the present, Entomology personnel have conducted large-volume mixing activities outdoors on the east side of Building 1014. Empty containers are triple rinsed into the mixing tank, crushed and sent to the sanitary landfill for disposal. Empty bags are also sent to the sanitary landfill. Small-volume mixing for personal sprayers is conducted in a similar fashion over the sink in Building 1003, and "minimal" amounts of pesticide may enter the sanitary sewer during this process. Until 1984, herbicides were mixed by Pavement and Grounds personnel outdoors by the CES washrack (Building 474). Cans were triple-rinsed to the drain, punctured, and discarded in the sanitary landfill. Eight years ago, this drain was equipped with an oil/water separator leading to the sanitary sewer; prior to then, it had discharged to the base surface drainage system.

According to Entomology personnel, there have been no significant spills in the area outside Building 1014, other than minimal splashing generated during the mixing process.

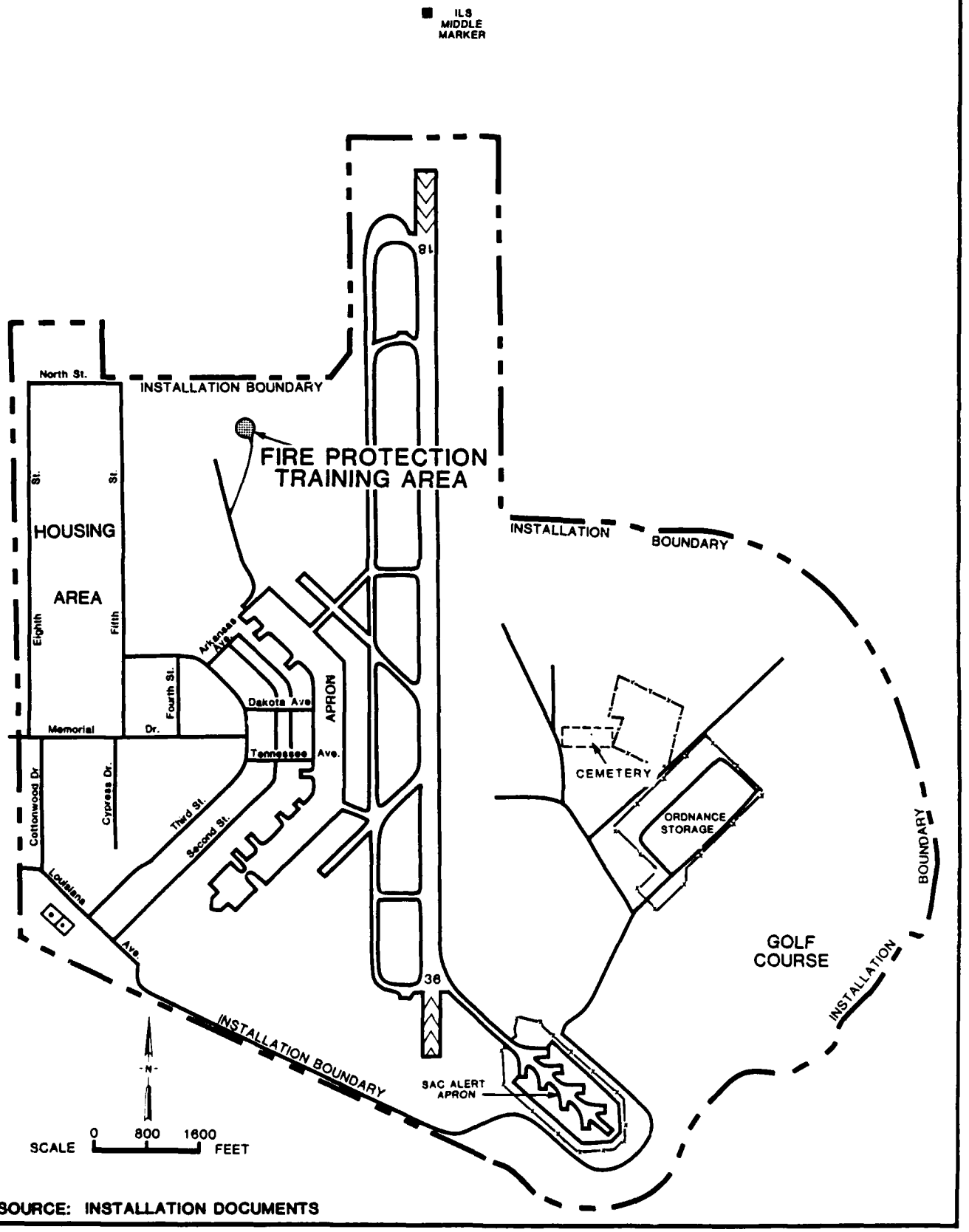
Fire Protection Training

Since 1955, fire training exercises have been conducted in a single area at Blytheville Air Force Base (Figure 4.5). This area is located in the northwest section of the base, approximately 800 feet north of the underground waste oil tanks. During the base's earlier active period (1942-46), there were no fire training exercises at this or any other site. From 1955 to the late 1960's, exercises were conducted approximately twice a week, using approximately 500 gallons of waste fuel and oil at each burn. Waste solvents were burned in a separate pit located next to the five protection training pit. Waste materials were delivered to the site in drums, bowsers and tanker trucks. Water and protein foam were used as extinguishing agents during this time period. After each exercise, water was drained to a second pit and allowed to evaporate/infiltrate.

FIGURE 4.5

BLYTHEVILLE AFB

FIRE PROTECTION TRAINING AREA



SOURCE: INSTALLATION DOCUMENTS

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After the late 1960's, the frequency of these exercises was reduced to approximately two times per month. Typically 300-400 gallons of contaminated JP-4 were used per burn. Other waste oils and fuels were no longer burned. Contaminated JP-4 used for burning is stored in a small above ground tank located near the FPTA. The extinguishing agent used during this time period was AFFF (aqueous film forming foam). Residual liquids were drained to an oil/water separator and discharged to the adjoining field. Accumulated oil is pumped out periodically and taken to the waste oil tank.

INSTALLATION WASTE DISPOSAL METHODS

The facilities at Blytheville AFB which have been used for the management and disposal of waste can be categorized as follows:

- Landfills
- Hardfill Disposal Areas
- Sanitary Sewer System
- Surface Drainage Systems
- Explosive Ordnance Disposal Area
- Low Level Radioactive Waste

Landfills

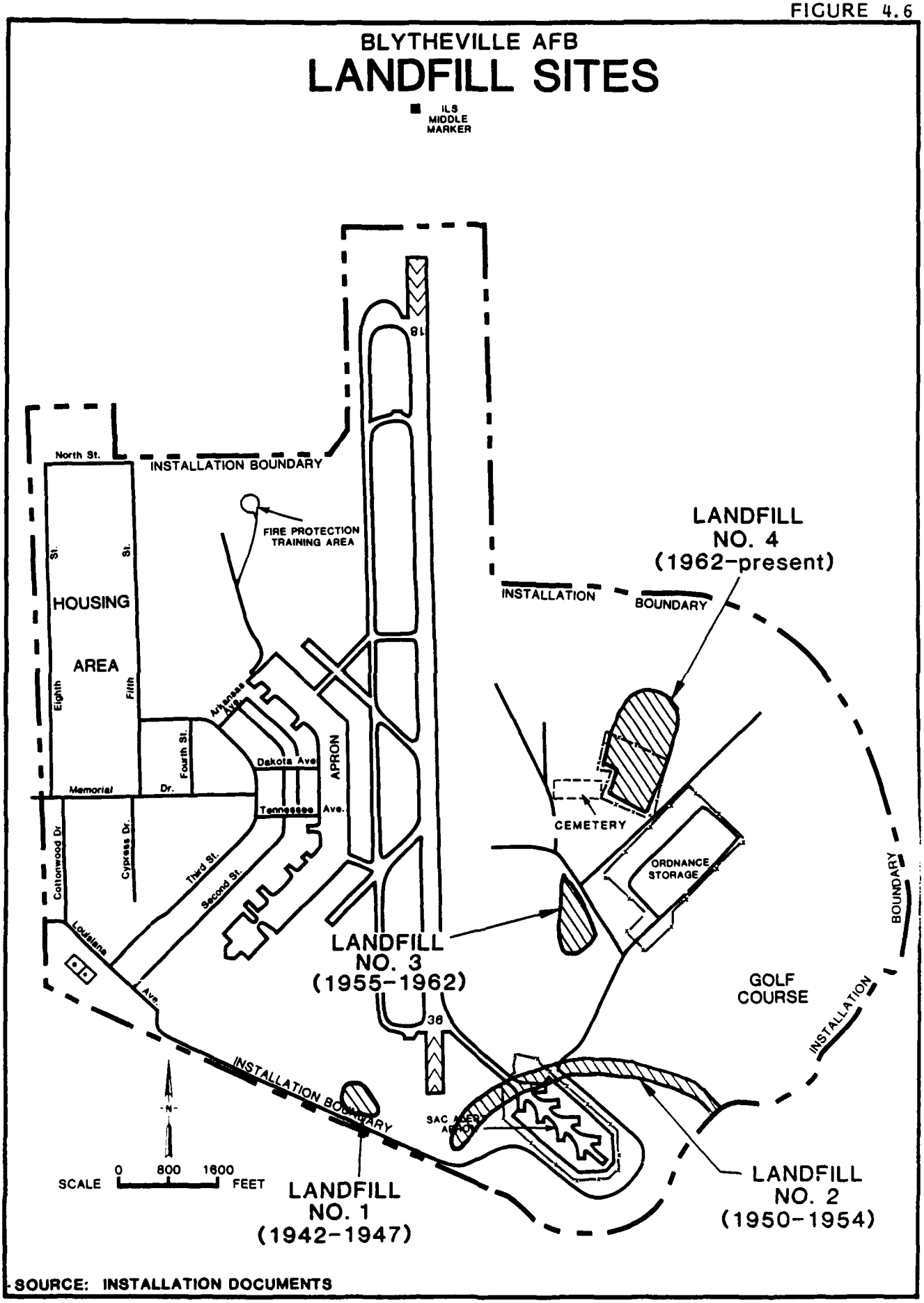
On-base landfills at Blytheville AFB have been used for disposal of non-hazardous solid wastes and some industrial waste materials. Landfills have been operated in the past at four locations, as shown in Figure 4.6. A summary of pertinent information associated with these landfills is presented in Table 4.2.

Landfill No. 1

Landfill No. 1 was operated from 1942 to 1947 and is located southeast of the water treatment plant. The estimated size of the landfill area is 1,600,000 cubic feet. This site was used primarily for disposal of ash from a base incinerator, although some refuse may have been directly deposited. During the deactivation of the base at the end of World War II, surplus material was disposed of in this area. This site is closed with a soil cover and has grass growing on the area.

FIGURE 4.6

BLYTHEVILLE AFB
LANDFILL SITES



SOURCE: INSTALLATION DOCUMENTS

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TABLE 4.2
SUMMARY OF LANDFILL DISPOSAL SITES

Landfill Designation	Period of Operation	Approximate Volume (ft^3)	Type of Waste	Method of Operation	Closure Status	Surface Drainage
No. 1	1942-1947	1,600,000	General refuse * and ash	Trench and fill, burning and cover	Closed, soil and grass cover	East to Pemiscot Bayou
No. 2	1950-1954	3,800,000	Municipal refuse*	Trench and fill, burning and cover	Closed, soil and grass cover	South and East to Pemiscot Bayou
No. 3	1955-1962	5,000,000	General refuse *	Trench and fill, burning and cover	Closed, soil and grass cover	East to Pemiscot Bayou
No. 4	1962-Present	20,000,000	General refuse *	Trench and fill	Active	East to Pemiscot Bayou

Note: The base was not operating between 1947 and 1954.
* Contained small quantities of industrial waste from the shops.

Landfill No. 2

Landfill No. 2 was operated by the city of Blytheville from 1950 to 1954 and was located in the vicinity of the SAC Alert area. Municipal waste was disposed of in trenches and some burning of the material occurred prior to covering. During the construction of the SAC Alert area in 1957, some of the refuse was uncovered. The waste material under the Alert Apron was removed and taken to Landfill No. 3. The site is closed with a soil cover and grass is growing on the site. The estimated size of the landfill is 3,800,000 cubic feet.

Landfill No. 3

Landfill No. 3 was operated from 1955 to 1962 and is located west of the munitions storage area. The landfill was a trench and fill operation with the trenches approximately 10 feet deep. Waste from shop dumpsters and household refuse was taken to this site. Only small amounts of hazardous wastes are suspected to be present at this site. Some burning of the waste prior to covering occurred. The estimated size of this landfill is 5,000,000 cubic feet. This site was closed with a soil cover and grass. Some buildings have been erected over the site.

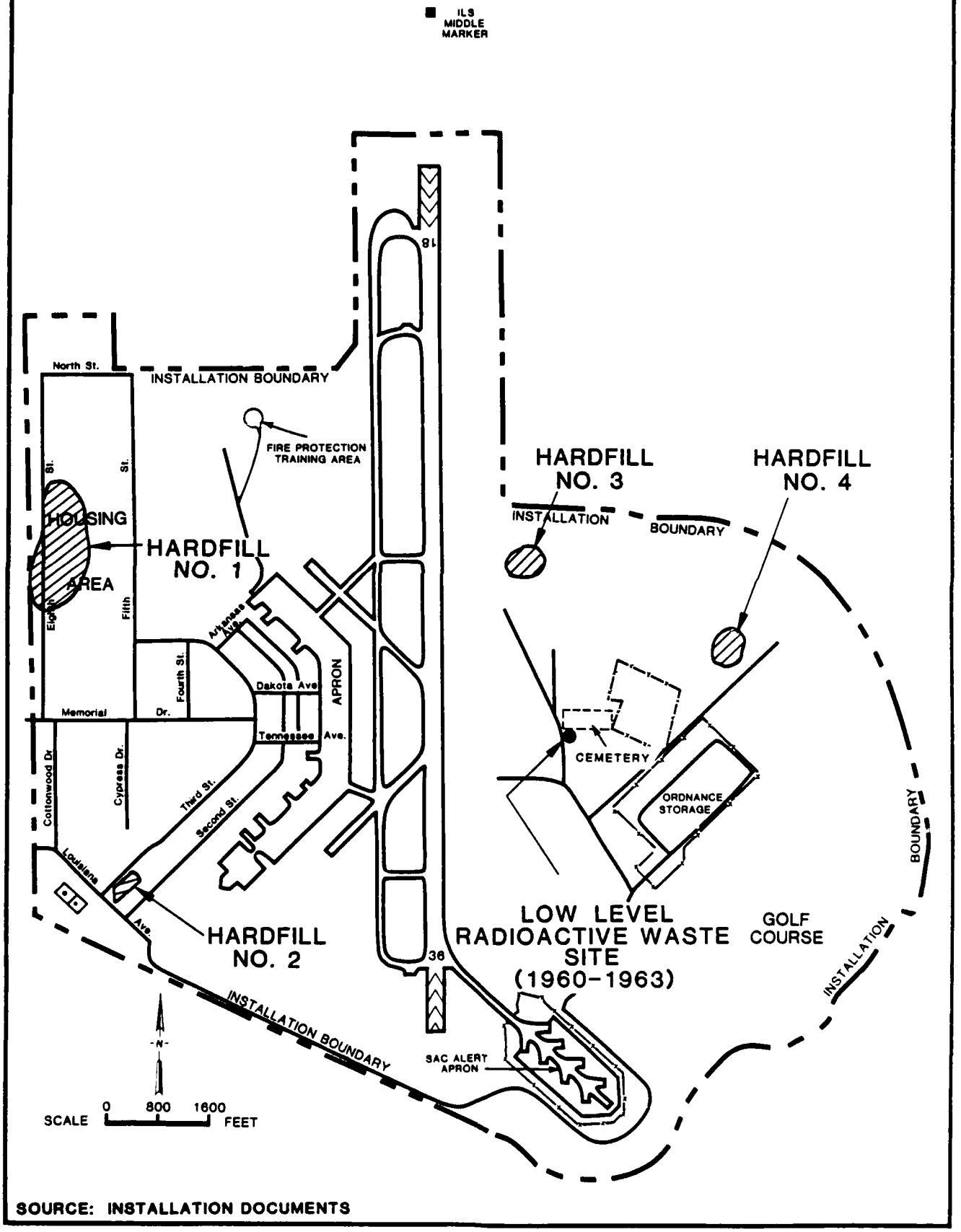
Landfill No. 4

Landfill No. 4 has been operated from 1962 to the present and is located north of the munitions storage area. This landfill is a trench and fill operation with trenches approximately fifteen feet in depth. Waste from shop dumpsters and household refuse is currently taken to this landfill. The active portion of the site is separated from the surrounding area by a fence, and the closed portions of the site have a soil and grass cover. During the last two years some base waste has been taken to the Blytheville city incinerator during periods of bad weather when Landfill No. 4 was inoperable. The landfill has an estimated size of 20,000,000 cubic feet.

Hardfill Disposal Areas

There are several areas at Blytheville AFB that have been used for disposal of construction rubble, brush and other hardfill. Major hardfill areas are identified in Figure 4.7. Based on interviews conducted with base personnel, review of file information and visual observations

BLYTHEVILLE AFB
HARDFILL SITES AND LOW LEVEL RADIOACTIVE WASTE SITE



SOURCE: INSTALLATION DOCUMENTS

made during the site visit, there is no evidence of any hazardous waste disposal associated with these hardfill areas.

Low Level Radioactive Waste

Low level radioactive waste in the form of radio tubes was buried near the cemetary in 1960 (See Figure 4.7). The area was fenced and posted at that time. Base personnel reported that the tubes were excavated and removed about 1962 or 1963. The soil surrounding the tubes was also removed and drummed for disposal at an off-base location.

Oil/Water Separators

There are eighteen oil/water separators at Blytheville AFB (see Figure 4.8). The areas served by these separators are listed in Table 4.3.

Each separator is inspected on a monthly basis and accumulated waste oil is pumped out as necessary and taken to the waste oil tanks. Water from the separators drains to the sanitary sewer.

Typically, the separators receive waste oil, fuel (JP-4 and MOGAS), and hydraulic fluids. Soapy washwaters, solvents, and small amounts of other materials may also be released to the system (see Table 4.1).

Surface Impoundments

Since 1978, excess deicing fluid (primarily ethylene glyol and water) and other runoff from the SAC Alert area have been collected by two unlined surface impoundments (see Figure 4.9). Together, these two ponds hold approximately 860,000 gallons. There has never been any discharge from either pond as all accumulated runoff has either evaporated or infiltrated. Prior to 1978, runoff from the area ultimately entered Pemiscot Bayou. These sites are not considered to represent an environmental problem.

Oxidation Ponds

Two small oxidation ponds located adjacent to the southwest corner of the ordnance storage area were used to receive washwater and other wastes from the base's dog kennels. Contents of the ponds were never discharged, and the ponds are currently out of service.

Sanitary Sewage System

Blytheville AFB's sanitary sewage collection system and treatment plant were originally constructed in 1942, at the same time the base was

TABLE 4.3
OIL/WATER SEPARATORS AT BLYTHEVILLE AFB

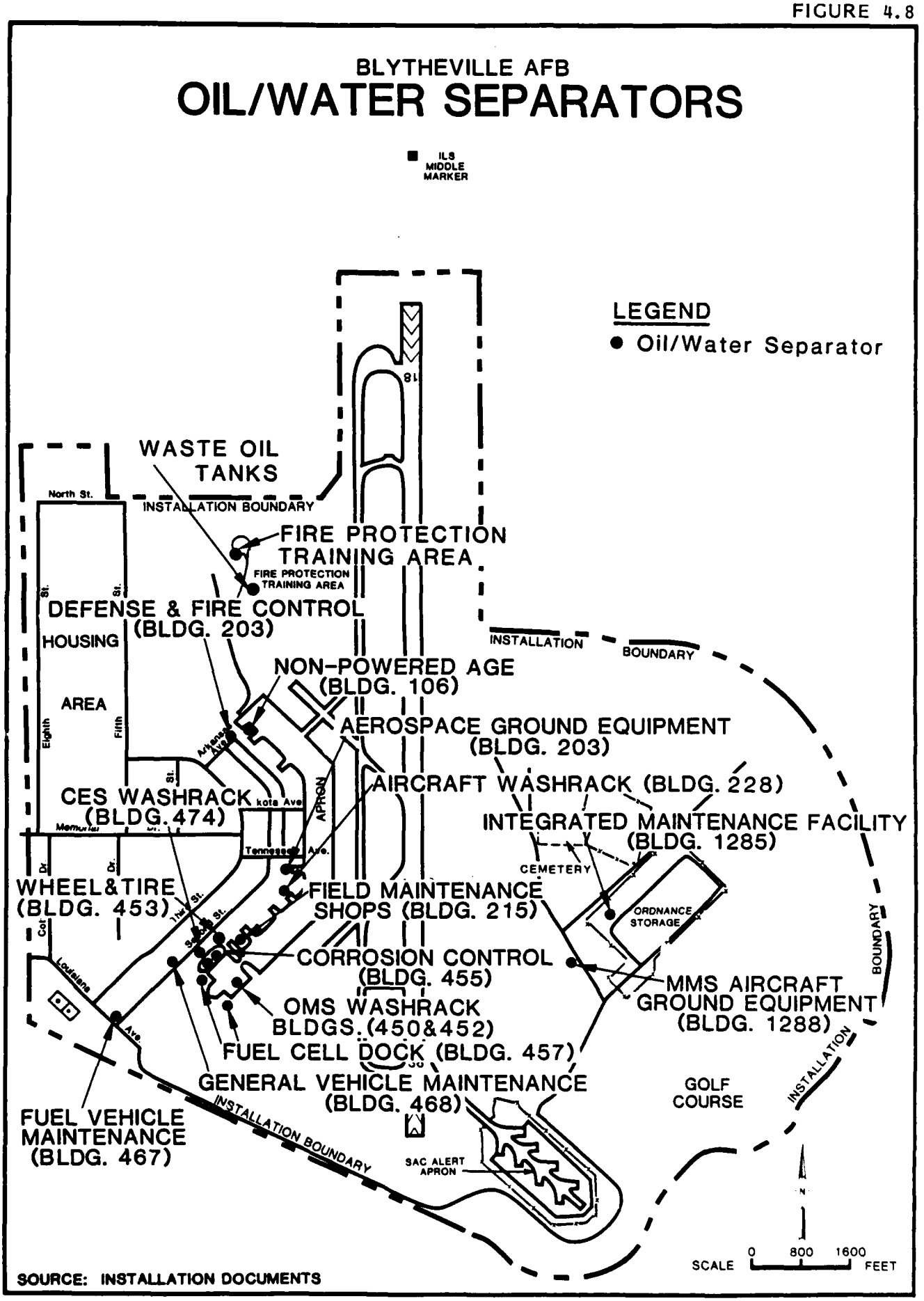
Building No.	Building Use
106	Non-Powered AGE
130	Avionics Maintenance Shops
203	Aerospace Ground Equipment
215	Field Maintenance Shops
228	Aircraft Washrack
450 & 452	Washrack (OMS)
453	Wheel & Tire
455 (two)	Corrosion Control
457 (two)	Fuel Cell Dock
467	Fuel Vehicle Maintenance
468	General Maintenance
474	Civil Engineering Washrack
1285	Integrated Maintenance Facility
1288	MMS Aircraft Ground Equipment
1340	Fire Protection Training Area
1344	Waste Oil Tanks

Source: Blytheville Air Force Base installation documents and personnel interviews.

FIGURE 4.8

BLYTHEVILLE AFB

OIL/WATER SEPARATORS



SOURCE: INSTALLATION DOCUMENTS

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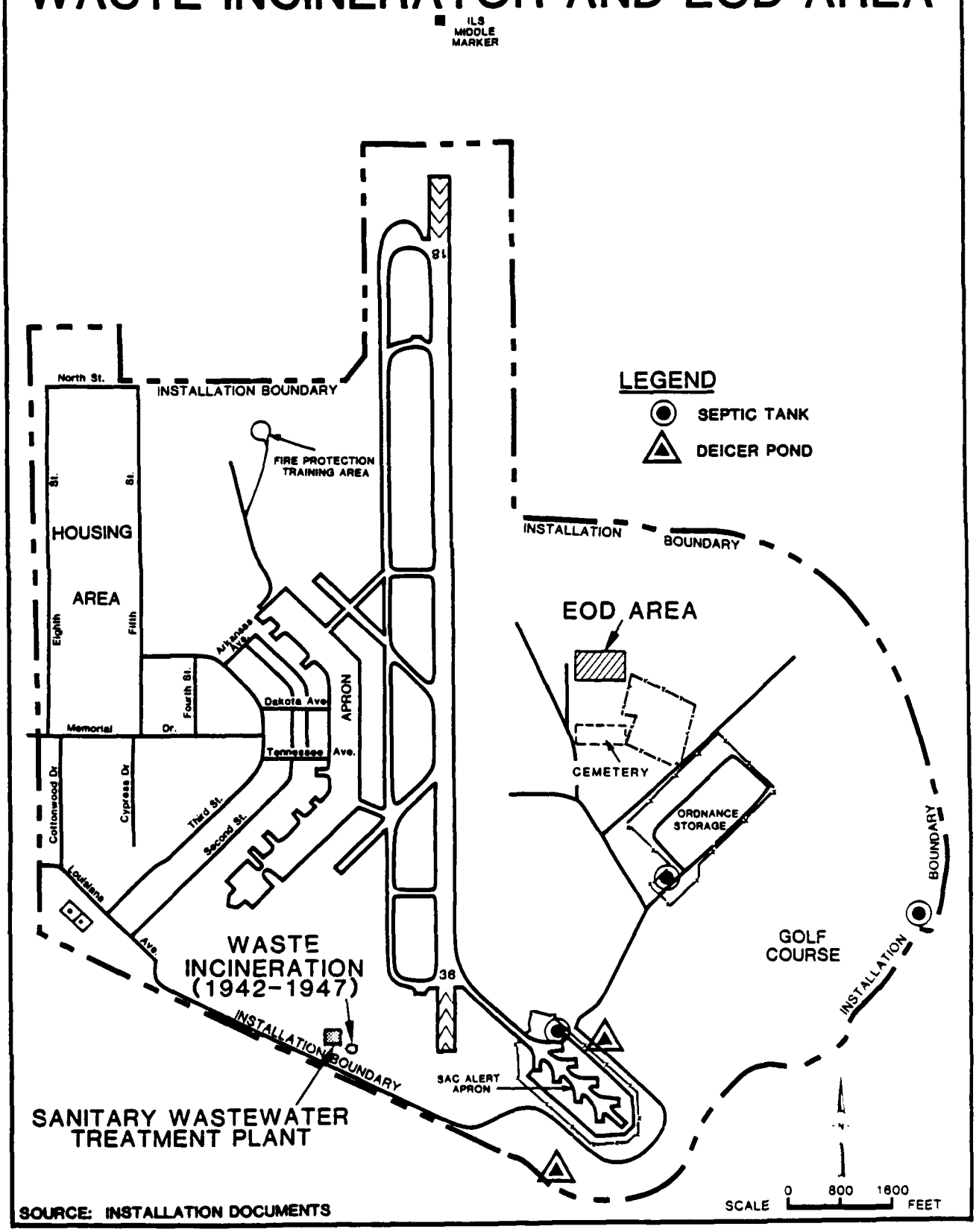
FIGURE 4.9

BLYTHEVILLE AFB

WASTEWATER TREATMENT WASTE INCINERATOR AND EOD AREA



SOURCE: INSTALLATION DOCUMENTS

ES ENGINEERING-SCIENCE

built (see Figure 4.9). During the reactivation of the base (1954-59), the system was expanded to include secondary treatment. Since 1942, the plant has treated wastes from all housing and shop areas. In remote areas not served by the sewer (e.g. golf course and construction areas), septic tanks are used.

Currently, the wastewater treatment process at Blytheville AFB consists of primary clarifiers, followed by a trickling filter, rotating biological contactor (RBC), secondary clarifiers, and a chlorine contact chamber. Sludge is anaerobically digested and placed on sludge drying beds. Leachate collected by the beds' underdrain system is recycled through the process, and dried sludge is sent to the sanitary landfill for disposal. Approximately 50 cubic yards per year of sludge are disposed in this fashion. Effluent from the sanitary treatment system is discharged via underground pipe to Pemiscot Bayou under an NPDES permit. Discharged effluent totals approximately 700,000 gallons per day.

Occasional oil and fuel spills received by the treatment system are removed in the primary clarifiers. Small quantities of other potentially hazardous materials have also been discharged to the sanitary sewage system (Table 4.1). No treatment performance problems due to these or any other adverse circumstances have been noted. The sanitary system is not considered to present a potential for contamination or migration of hazardous materials based upon present or past operations.

Surface Drainage Systems

Surface drainage from the airfield pavement and adjacent areas ultimately enters Pemiscot Bayou via a system of open ditches and underground pipelines (see Figures 3.3 and 3.10). This system has not been intentionally used for the disposal of waste materials; however, it has received minor spills and other contaminated runoff generated by base activities. Considering the types and quantities of materials that have been discharged to the surface drainage system and the flushing/dilution that has taken place, the potential for contamination from past activities is minimal.

Incinerators

Currently, the only active incinerator at Blytheville AFB is located at Blytheville's USAF Hospital and is used to burn pathological wastes. This double chamber incinerator operates at 1000°C and has been in use since 1959. Approximately 50 pounds of ash are generated each week, placed in a dumpster, and disposed in the active on-base sanitary landfill.

A second incinerator, used to burn refuse during World War II, was located adjacent to the wastewater treatment plant. Ash from incinerator operations was buried to the southeast of the treatment plant (see Figure 4.9).

Explosive Ordnance Disposal Area

The Explosive Ordnance Disposal (EOD) area at Blytheville AFB is located northwest of the sanitary landfill (see Figure 4.9). This area consists of an open, grassless field, and several small bunkers for the protection of personnel participating in detonation activities. Explosives are burned or detonated in six-foot deep pits and residues are covered with four feet of topsoil.

EVALUATION OF PAST DISPOSAL ACTIVITIES AND FACILITIES

Review of past waste generation and management practices at Blytheville AFB has resulted in identification of 14 sites and/or activities which were considered as areas of concern for potential contamination and migration of contaminants.

Sites Eliminated from Further Evaluation

The sites of initial concern were evaluated using the Flow Chart presented in Figure 1.2. Sites not considered to have a potential for contamination were deleted from further evaluation. The sites which have potential for contamination and migration of contaminants were evaluated using the Hazard Assessment Rating Methodolgy (HARM). Table 4.4 summarizes the results of the flow chart logic for each of the areas of initial concern.

Five of the 14 sites assessed did not warrant further evaluation. The rationale for omitting these sites from HARM evaluation is discussed below. These five sites include:

- o Spill Site No. 4 (Auto Hobby Shop Bowser)
- o Pesticide Handling
- o Hardfill Sites
- o Low-Level Radioactive Waste Site
- o EOD area

At Spill Site No. 4 (Auto Hobby Shop Bowser) the oil bowser has been moved to a paved area and the stained soil associated with its past use has been excavated and disposed in the active on-base sanitary landfill. Since both the source of contamination and the stained soil have been removed, this site does not represent a source of significant environmental contamination.

Review of the pesticide handling operations and the rinsing and mixing sites does not indicate a potential source of contamination. No major spills have been reported, and the only known release was the periodic discharge of pesticide rinsewater to the storm drain prior to 1977. Therefore, pesticide operations are not considered for further evaluation.

The three hardfill sites located on the base were used only for the disposal of construction rubble. No evidence of hazardous waste disposal was found at any of these three sites.

The contaminated material at the low-level radioactive waste burial site was removed in the early 1960's. This site does not represent a potential source of environmental contamination.

The EOD area is not suspected of containing any hazardous materials. Waste residues in this area have been burned or detonated and are thus in an inert form that is not likely to pose an environmental threat.

Sites Evaluated Using HARM

The remaining nine sites identified in Table 4.4 were evaluated using the Hazard Assessment Rating Methodology. The HARM process takes into account characteristics of potential receptors, waste characteris-

TABLE 4.4
SUMMARY OF FLOW CHART LOGIC FOR AREAS OF
INITIAL HEALTH, WELFARE AND ENVIRONMENTAL CONCERN
AT BLYTHEVILLE AFB

Site	Potential to Health, Welfare or Environment	Need for Further IRP Evaluation/ Action	HARM Rating
Underground Waste Oil Tanks	Yes	Yes	Yes
Spill Site No. 1 (JP-4 Hydrant Leak)	Yes	Yes	Yes
Spill Site No. 2 (JP-4 Hydrant Leak)	Yes	Yes	Yes
Spill Site No. 3 (KC-135 Fuel Spill)	Yes	Yes	Yes
Spill Site No. 4 (Auto Hobby Shop Bowser)	Yes	No	No
Pesticide Handling	No	No	No
Fire Protection Training Area	Yes	Yes	Yes
Landfill No. 1	Yes	Yes	Yes
Landfill No. 2	Yes	Yes	Yes
Landfill No. 3	Yes	Yes	Yes
Landfill No. 4	Yes	Yes	Yes
Hardfill Sites	No	No	No
Low Level Radioactive Waste Site	Yes	No	No
EOD Disposal Area	No	No	No

Source: Engineering-Science

tics, pathways for migration, and specific characteristics of the site related to waste management practices. Results of the HARM analysis for the sites are summarized in Table 4.5.

The procedures used in the HARM system are outlined in Appendix G and the specific rating forms for the nine sites at Blytheville AFB are presented in Appendix H. The HARM system is designed to indicate the relative need for follow-on action. Photographs of these sites are included in Appendix F.

TABLE 4.5
SUMMARY OF HARM SCORES FOR
POTENTIAL CONTAMINATION SITES
AT BLYTHEVILLE AFB

Rank	Site	Receptor Subscore	Waste Characteristics Subscore	Pathways Subscore	Waste Management Factor	HARM Score
1	Fire Protection Training Area	54	90	74	1.0	73
2	Spill Site No. 2	58	80	81	1.0	73
3	Spill Site No. 1	54	80	67	1.0	67
4	Spill Site No. 3	47	64	74	1.0	62
5	Underground Waste Oil Tanks	60	54	61	1.0	61
6	Landfill No. 4	47	48	74	1.0	56
7	Landfill No. 2	52	32	81	1.0	55
8	Landfill No. 1	56	32	74	1.0	54
9	Landfill No. 3	52	32	74	1.0	53

Source: Engineering-Science

SECTION 5
CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is potential for environmental contamination resulting from past waste disposal practices and to assess the probability of contamination migration from these sites. The conclusions given below are based on field inspections; review of records and files; review of the environmental setting; interviews with base personnel, past employees and local, state and federal government employees; and assessments using the HARM system. Table 5.1 contains a list of the potential contamination sources identified at Blytheville AFB and a summary of the HARM scores for those sites.

FIRE PROTECTION TRAINING AREA

The FPTA has been used at the base since 1955 for fire training exercises. The site has a significant potential for environmental contamination and follow-on investigation is warranted. Presently only contaminated jet fuel is burned during training exercises. From 1955 to approximately 1970 fuel, waste solvents, hydraulic oils, and other combustible materials were used. Exercises were performed at two different locations within the FPTA. The soils of the site are assumed to be composed of silt loam but may contain sandy loam. These type soils are poorly drained and exhibit poor permeability. Ground water is assumed to be 15 feet below land surface. The site received a HARM Score of 73.

SPILL SITE NO. 2

Spill Site No.2 has a significant potential for environmental contamination and follow-on investigation is warranted. Pressure testing of the JP-4 hydrant system in 1974 indicated the presence of a leak near the junction of the north and south access roads. An unknown quantity of fuel was lost. During the repair work the ground was

TABLE 5.1
SITES EVALUATED USING THE
HAZARD ASSESSMENT RATING METHODOLOGY
BLYTHEVILLE AFB

Rank	Site	Operation Period	HARM Score(1)
1	Fire Protection Training Area	1955-Present	73
2	Spill Site No. 2	1973-1974	73
3	Spill Site No. 1	1973-1974	67
4	Spill Site No. 3	1981	62
5	Underground Waste Oil Tanks	1972-Present	61
6	Landfill No. 4	1962-Present	56
7	Landfill No. 2	1950-1954	55
8	Landfill No. 1	1942-1947	54
9	Landfill No. 3	1955-1962	53

(1) This ranking was performed according to the Hazard Assessment Rating Methodology (HARM) described in Appendix G. Individual rating forms are in Appendix H.

saturated with fuel leading base personnel to estimate that a large quantity of fuel was lost. Only a small amount of fuel was recovered. Ground water in this area is about 15 feet deep and the site is next to a drainage ditch. The site received a HARM score of 73.

SPILL SITE NO. 1

Spill site No. 1 has a significant potential for environmental contamination and follow-on investigation is warranted. Pressure testing of the JP-4 hydrant system in 1973 indicated the presence of a leak northwest of Building 1235. An unknown quantity of fuel was lost. During the repair work, the ground was observed to be saturated with fuel leading base personnel to estimate that a large quantity of fuel was lost. Only a small amount of fuel was recovered. The water table in this area is about 15 feet deep. The site received a HARM score of 67.

SPILL SITE NO. 3

In 1981, the aborted takeoff of a KC-135 tanker resulted in the loss of JP-4. Following the accident, spilled fuel was collected in a pit by taxiway D and allowed to evaporate/infiltrate over a period of several days. The soils in the area are assumed to be a silty loam with a 30-foot clay loam underlaying them. The site has potential for environmental contamination and follow-on investigation is warranted. The site received a HARM score of 62.

UNDERGROUND WASTE OIL TANKS

Since 1972, waste oil has been accumulated in four 4000-gallon underground tanks which are located north of the flightline in complex 1344. Waste oils, solvents and fuels are stored here prior to removal by a contractor for reuse at on off-base facility. Spills have occurred during loading and unloading operations. The ground water in this area is about 15 feet deep. The site represents a potential for environmental contamination and follow-on investigation is warranted. The site received a HARM score of 61.

LANDFILL NO. 4

Landfill No. 4 has operated since 1962 and currently receives household refuse and waste from shop dumpsters. Small amounts of hazardous wastes are suspected to be present in the landfill. The landfill is a trench and fill operation, with the trenches extending to a depth of 15 feet. The site has a total capacity of 20,000,000 ft^3 and has expansion capability. The filled portion of the site has a soil and grass cover. The site represents a potential for environmental contamination and follow-on investigation is warranted. The site received a HARM Score of 56.

LANDFILL NO. 2

Landfill No. 2 was operated by the City of Blytheville from 1950 to 1954 and is near the current SAC alert area. Municipal refuse was disposed of in trenches and some burning of material occurred. Some of the refuse was removed during the construction of the SAC alert area and was deposited in Landfill No. 3. The landfill contained an estimated volume of 3,800,000 ft^3. The site is closed and has soil cover with grass. Landfill No. 2 has a potential for environmental contamination and follow-on investigation is warranted. The site received a HARM Score of 55.

LANDFILL NO. 1

Landfill No. 1 was operated from 1942 to 1947 and is located east of the water treatment plant. The landfill contains approximately 1,600,000 ft^3 of material which consists of ash from the base incinerator and some refuse. During deactivation of the base in 1947, surplus material was disposed of in this area. The site is closed with a soil and grass cover. The site represents a potential for environmental contamination and follow-on investigation is warranted. The site received a HARM Score of 54.

LANDFILL NO. 3

Landfill No. 3 was operated by BAFB from 1955 to 1962. The landfill was a trench and fill operation with the trenches approximately 10

closed with a soil and grass cover. There are some buildings constructed over the landfill. Although only small amounts of hazardous wastes are suspected to be present, the site represents a potential for environmental contamination and follow-on investigation is warranted. The site received a HARM Score of 53.

SECTION 6

RECOMMENDATIONS

Nine sites were identified at Blytheville AFB as having the potential for environmental contamination. These sites have been evaluated using the HARM system. This evaluation assessed their relative potential for environmental contamination and identified those sites where further study and monitoring may be necessary. Those sites with sufficient evidence of environmental contamination, that they should be investigated in Phase II, are of primary concern.

PHASE II MONITORING RECOMMENDATIONS

The following recommendations are made to further assess the potential for environmental contamination from waste disposal areas at Blytheville AFB. The recommended actions are generally one-time sampling programs to determine if contamination does exist at the site. If contamination is identified, the sampling program may need to be expanded to further define the extent of contamination.

Geophysical surveys, consisting of electrical resistivity, electromagnetic and/or magnetometer techniques, are recommended prior to the installation of monitoring wells at the four landfill sites. The surveys are performed to help delineate the horizontal and vertical extent of the site and any subsurface leachate plumes migrating from the site. Preliminary checks with one or more geophysical techniques on and in the vicinity of the site should be made to determine the effectiveness of a particular geophysical technique prior to a complete site survey. Following the geophysical surveys, the proper placement of groundwater monitoring wells can be determined.

While soil boring and well installation is being performed, readings with an organic vapor analyzer (OVA) or similar equipment should be made. Such equipment can be used as a screening device to

determine those soil samples to be put aside for chemical analyses and can also be used as a health and safety device for the protection of the field crew from potentially harmful organic vapors.

Those sites with a potential for ground-water contamination should be monitored with two-inch diameter wells consisting of Schedule 40 PVC screens and casing with threaded joints. If the initial ground-water samples indicate contamination, additional wells may be required. The number of wells may be reduced if the geophysical techniques are successful in identifying subsurface leachate plumes.

The recommended monitoring program for Phase II is discussed by site in the following subsections and summarized in Table 6.1.

Fire Protection Training Area

The Fire Protection Training Area has a potential for environmental contamination and monitoring of this site is recommended. Prior to soil sampling and well installation, an electrical sensitivity study should be conducted. The survey should be directed at the shallow depths (0 to about 100 feet). The survey, if effective, should be used to guide the placement of two soil borings in the burn area itself, and a third boring in the adjacent drainage ditch. An OVA should be operated during the boring procedure. The soil borings should be terminated at the water table (approximately 15 feet). Soil samples at 5-foot intervals or where high OVA readings occur should be analyzed for the parameters listed in Table 6.2. If soil contamination is observed, additional soil borings may be performed to define the extent of soil contamination. Using the geophysical survey as a guide, one upgradient and two downgradient wells should be installed within the uppermost aquifer of the site (Figure 6.1). The wells should be screened in the vicinity of the water table surface and should be constructed as previously described. Water samples from the wells will be analyzed for the parameters listed in Table 6.2.

Spill Site No. 2

Spill Site No. 2 is the site of JP-4 loss. This site has the potential for contamination of the environment. Prior to the soil sampling, an electrical sensitivity study should be conducted. The survey should be directed at the shallow depths (30-35 feet). The survey, if effective, should be used to guide the placement of a soil

TABLE 6.1

RECOMMENDED MONITORING PROGRAM FOR
PHASE II BLYTHEVILLE AFB

Site Name	Rating Score	Recommended Monitoring	Sample Analyses	Comments
Fire Protection Training Area	73	Conduct Geophysical Survey. Conduct core sampling to the water table. Use OVA during boring. Collect soil samples at 5-foot intervals and at depths of high OVA readings. Install and sample one upgradient and two downgradient wells.	See list Table 6.2	If sampling indicates contamination continue monitoring. Additional monitoring wells/soil borings may be necessary to assess extent of contamination.
Spill Site No. 2	73	Conduct Geophysical Survey. Conduct core sampling to the water table. Use OVA during boring. Collect soil samples at 2-foot intervals and at depths of high OVA readings.	Oil and Grease	If sampling indicates contamination continue monitoring. Monitoring wells and additional soil borings may be necessary to assess extent of contamination.
Spill Site No. 1	67	Conduct core sampling to the water table. Use OVA during boring. Collect soil samples at 5-foot intervals and at depths of high OVA readings.	Oil and Grease	If sampling indicates contamination continue monitoring. Monitoring wells and additional soil borings may be necessary to assess extent of contamination.
Spill Site No. 3	62	Conduct core sampling to the water table. Use OVA during boring. Collect soil samples at 5-foot intervals and at depths of high OVA readings.	Oil and Grease	If sampling indicates contamination continue monitoring. Monitoring wells and additional soil borings may be necessary to assess extent of contamination.
Underground Waste Oil Tanks	61	Conduct core sampling at 2 locations to the water table. Use OVA during boring. Collect soil samples at 2-foot intervals and at depths of high OVA readings.	See list Table 6.2	If sampling indicates contamination continue monitoring. Monitoring wells and additional soil borings may be necessary to assess extent of contamination.

TABLE 6.1
RECOMMENDED MONITORING PROGRAM FOR
PHASE II BLYTHEVILLE AFB
(Continued)

Site Name	Rating Score	Recommended Monitoring	Sample Analyses	Comments
Landfill No. 4	56	Conduct Geophysical Survey. Install and sample one upgradient and three downgradient wells.	See list Table 6.2	If sampling indicates contamination continue monitoring. Soil borings and additional wells may be necessary to assess extent of contamination.
Landfill No. 2	55	Conduct Geophysical Survey. Install and sample two upgradient and two downgradient wells.	See list Table 6.2	If sampling indicates contamination continue monitoring. Soil borings and additional wells may be necessary to assess extent of contamination.
Landfill No. 1	54	Conduct Geophysical Survey. Install and sample one upgradient and two downgradient wells.	See list Table 6.2	If sampling indicates contamination continue monitoring. Soil borings and additional wells may be necessary to assess extent of contamination.
Landfill No. 3	53	Conduct Geophysical Survey. Install and sample one upgradient and two downgradient wells.	See list Table 6.2	If sampling indicates contamination continue monitoring. Soil borings and additional wells may be necessary to assess extent of contamination.

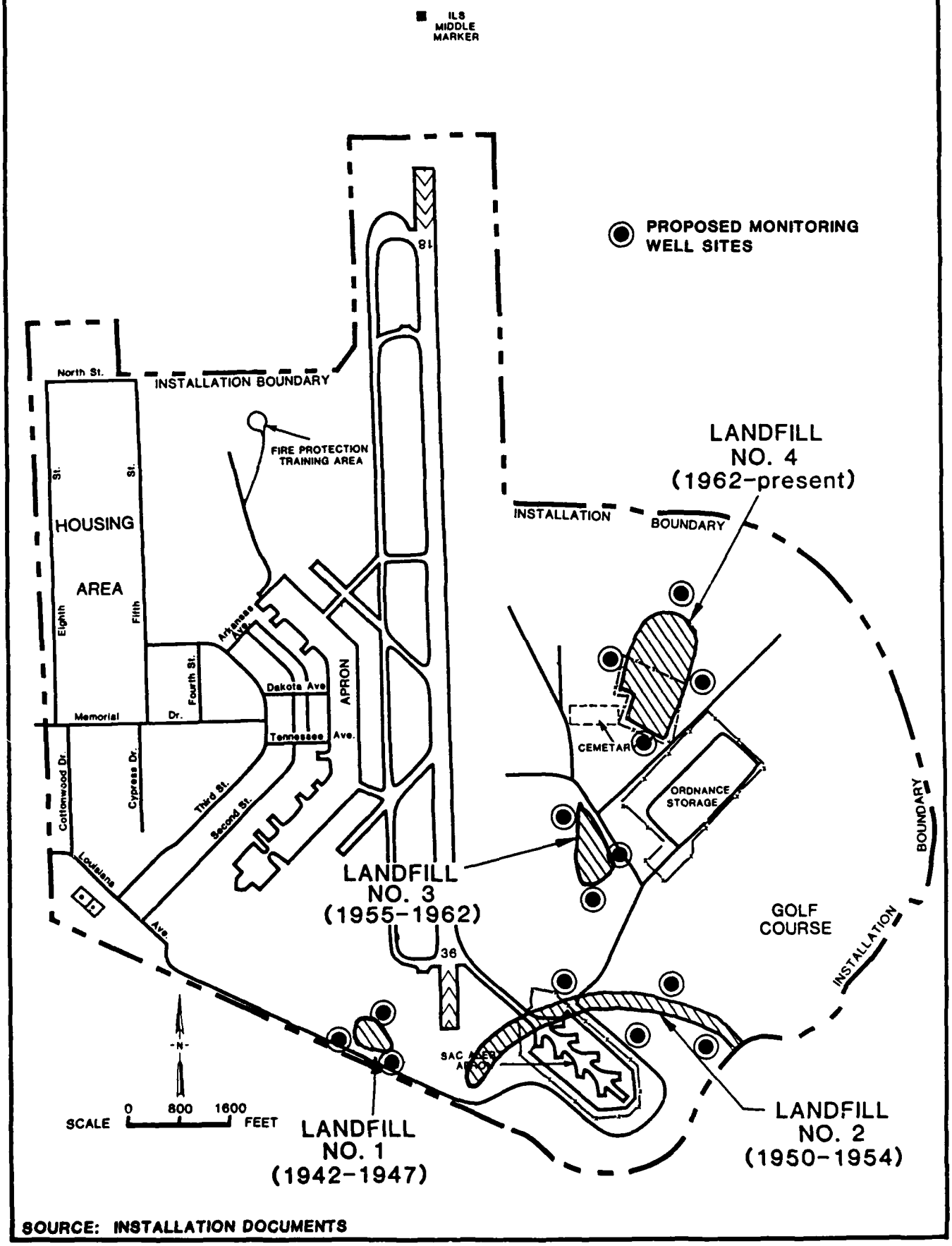
Notes: Sample analyses shall include oil and grease, total organic carbon, total organic halogens, phenolics, and lead.

TABLE 6.2
RECOMMENDED LIST OF ANALYTICAL PARAMETERS

Parameters	Analytical Methods	
	Soils	Waters
Oil and Grease	E413.2	E413.2
Volatile Organic Compounds	EPA 8010/8020	EPA 601/602
Phenolics	SW 8040	E420.2
Lead	SW 7420	E239.1

FIGURE 6.1

BLYTHEVILLE AFB
PROPOSED LANDFILL MONITORING WELL SITES



SOURCE: INSTALLATION DOCUMENTS

ES ENGINEERING-SCIENCE

boring terminating at the water table (approximately 15 feet). An OVA should be operated during the boring process. Soil samples should be taken at 5-foot intervals and/or where high OVA readings are encountered. All soil samples should be analyzed for oil and grease.

Spill Site No. 1

Spill Site No. 1 is the site of JP-4 loss. This site has the potential for contamination of the environment. A soil boring should be performed at the site terminating at the water table (approximately 15 feet). An OVA should be operated during the boring process. Soil samples should be taken at 5-foot intervals and/or where high OVA readings are encountered. All soil samples should be analyzed for oil and grease.

Spill Site No. 3

Spill Sites No. 3 is the site of JP-4 loss. This site has the potential for contamination of the environment. A soil boring should be performed at the site terminating at the water table (approximately 15 feet). An OVA should be operated during the boring process. Soil samples should be taken at 5-foot intervals and/or where high OVA readings are encountered. All soil samples should be analyzed for oil and grease.

Underground Waste Oil Tanks

The underground waste oil tanks have a potential for environmental contamination and monitoring of this site is recommended. Two soil borings should be made at the site to be terminated at the water table (approximately 15 feet). The borings should be located next to the unloading area or any area showing visual contamination. While the soil borings are being performed, reading with an organic vapor analyzer (OVA) or similar equipment should be made. Soil samples should be taken every 2 feet and analyzed for the parameters listed in Table 6.2.

Landfill No. 4

Landfill No. 4 represents a potential for contamination of the environment, and monitoring is recommended. Prior to the well installation, a geophysical survey of the area should be conducted. The survey should be directed at the depths between zero and 100 feet. The survey should be used to guide the placement of monitoring wells. One upgradient and three downgradient wells should be installed within the

uppermost aquifer of the site (Figure 6.1). The wells should be screened approximately 20 feet into the water table aquifer, and should terminate at an approximate depth of 35 feet. The wells will be constructed as previously described. Water samples from the wells will be analyzed for the parameters listed in Table 6.2.

Landfill No. 2

Landfill No. 2 represents a potential for contamination of the environment, and monitoring is recommended. Prior to the well installation, a geophysical survey of the area should be conducted. The survey should be directed at the shallow depths (0-35 feet). The survey should be used to guide the placement of monitoring wells. Two upgradient and two downgradient wells should be installed within the uppermost aquifer of the site (Figure 6.1). The wells should be screened approximately 20 feet into the water table aquifer, and should terminate at an approximate depth of 35 feet. The wells will be constructed as previously described. Water samples from the wells will be analyzed for the parameters listed in Table 6.2.

Landfill No. 1

Landfill No. 1 represents a potential for contamination of the environment, and monitoring is recommended. Prior to the well installation, a geophysical survey of the area should be conducted. The survey should be directed at the shallow depths (0-35 feet). The survey should be used to guide the placement of monitoring wells. One upgradient and two downgradient wells should be installed within the uppermost aquifer of the site (Figure 6.1). The wells should be screened approximately 20 feet into the water table aquifer, and should terminate at an approximate depth of 35 feet. The wells will be constructed as previously described. Water samples from the wells will be analyzed for the parameters listed in Table 6.2.

Landfill No. 3

Landfill No. 3 represents a potential for contamination of the environment, and monitoring is recommended. Prior to the well installation, a geophysical survey of the area should be conducted. The survey should be directed at the shallow depths (0-35 feet). The survey should be used to guide the placement of monitoring wells. One upgradient and two downgradient wells should be installed within the uppermost aquifer

of the site (Figure 6.1). The wells should be screened approximately 20 feet into the water table aquifer, and should terminate at an approximate depth of 35 feet. The wells will be constructed as previously described. Water samples from the wells will be analyzed for the parameters listed in Table 6.2.

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APPENDIX A

BIOGRAPHICAL DATA

Biographical Data

ERNEST J. SCHROEDER

Environmental Engineer
Manager, Solid and Hazardous Waste Dept.

Personal Information

[redacted]

Education

B.S. in Civil Engineering, 1966, University of Arkansas, Fayetteville, Arkansas
M.S. in Sanitary Engineering, 1967, University of Arkansas, Fayetteville, Arkansas

Professional Affiliations

Registered Professional Engineer (Arkansas No. 3259, Georgia No. 10618, and Texas No. 33556)
Water Pollution Control Federation
American Academy of Environmental Engineers

Honorary Affiliations

Chi Epsilon

Experience Record

1967-1976 Union Carbide Technical Center, Engineering Department, South Charleston, West Virginia (1967-1968). Project Engineer. Responsible for environmental protection engineering projects for various organic chemicals and plastics plants.

Union Carbide Corporation, Environmental Protection Department, Texas City, Texas (1969-1975). Project Engineer and Engineering Supervisor. Responsible for various aspects of plant pollution abatement programs, including preparation of state and federal permits for wastewater treatment activities, operations representative on $8 million regional wastewater treatment project (pocess design, detailed design, construction and startup), and supervisor for operation of wastewater collection and treatment facilities.

Union Carbide Corporation, Environmental Protection Project Engineer, Toronto, Ontario, Canada (1975-1976). Responsible for the environmental permitting and engineering design of waste treatment systems associated with a new refinery.

Ernest J. Schroeder (Continued)

1976-Date Engineering-Science, Inc., Project Manager (1976-1978). Engineering and project management of various industrial wastewater and hazardous waste projects.

Engineering-Science, Inc., Manager of the Industrial Waste Group in the Atlanta, Georgia office (1978-1980). Responsible for the supervision of industrial waste project managers and project engineers and the management of industrial waste studies conducted in the office. Also directly involved in project management consulting with clients on environmental studies and environment assessment projects, e.g., project manager for several spill control and wastewater treatability projects and for a third-party EIS for a new phosphate mine in Florida.

Engineering-Science, Inc., Manager of Solid and Hazardous Waste Group in the Atlanta, Georgia office (1980-date). Responsible for the supervision of solid and hazardous waste project managers and project engineers and the management of solid and hazardous waste projects in the office. Project activities have included permit and regulatory assistance, environmental audits, waste management program development, delisting partitions, ground-water monitoring, landfill evaluations, landfill closure design, hazardous waste management, waste inventory, waste recovery/recycle evaluation, waste disposal alternative evaluation, transportation evaluation, and spill control and countermeasure planning, HRS evaluations, preparation of remedial investigations and feasibility studies, and design and construction supervision for hazardous waste site cleanup.

Project Manager for fourteen Phase I Installation Restoration Program projects for the U.S. Air Force. The objective of this program is to audit past hazardous waste disposal practices that could result in migration of contaminants and recommend priority sites requiring further investigation. Also conducted environmental audits (air, water and solid waste) at ten industrial facilities. Project manager for a contamination assessment and hazardous waste site cleanup conducted for an industrial client as part of a consent degree agreement. Project manager for site investigation and contamination assessment projects at multiply hazardous waste sites in the northeast. Project manager for preparation of two Remedial Investigation/Feasibility Studies.

Biographical Data

ROBERT S. McLEOD, P.E.

Hydrologist

Personal Information:

[redacted]

Education:

B.S., Civil Engineering, University of Illinois, 1962
M.S., Civil Engineering, University of Wisconsin, 1965
Full-time advanced graduate studies, University of Wisconsin, 1966-67, 1969-70

Professional Affiliations

Registered Professional Engineer, (Georgia NO. CE12684)
American Society of Civil Engineers
American Water Resources Association
National Water Well Association

Experience Record

1962-1964 U.S. Army Corps of Engineers. Staff Engineer. Involved in a low-head dam rehabilitation project. Monitored dredging operations for turning basins in small harbors.

1964-1980 U.S. Geological Survey. Project Chief. Conducted numerous surface water studies, ground-water studies and study defining the relationship between surface and ground waters. Concurrently served as Computer Applications Section Chief during the period 1972 to 1980. Developed a digital-computer program for computing changes in ground-water elevations and changes in flow to surface waters caused by pumping from an aquifer system. Also developed numerous programs for storing and displaying various types of hydrologic data.

Project Hydrologist. Participated in surface and ground water investigations. Identified ground water sources for industrial and municipal supplies. Determined flood-frequency relationships for streams and the magnitude and frequency of low flow from streams.

1980-1982 Law Engineering Testing Company, Atlanta, Georgia. Project Manager. Responsible for coal hydrology involving geologic and hydrologic analyses of mining sites descriptions of site geology, and estimates on probable hydrologic consequences of mining as part of the Office of Surface Mining Small Operator Assistance Program.

Director of Analysis and Reporting and Hydrogeologist. Directed the analysis of data for evaluating the feasibility of using salt domes in the Gulf Coast area for the storage of high-level nuclear wastes. Defined site geology, hydrology, groundwater flow direction, and potential rates for contaminant transport.

1982-Date Engineering-Science, Inc., Atlanta, Georgia. Project Manager for numerous hazardous waste investigations involving surface and ground water contamination. These studies have included remedial investigations for defining the relationship between surface and ground waters, the extent of contamination in soils and water, ground-water flow directions, aquifer properties, ground-water chemistry, and rates of contaminant movement in ground waters. These studies have also included feasibility studies for investigating remedial alternatives for the cleanup of contaminated soils and waters and the supervision of construction activities for the implementation of ground-water recovery systems.

Project Hydrologist on numerous Department of Defense studies to identify and evaluate past hazardous material disposal sites at U.S. Air Force installations. The environmental setting was described at the installations as a part of these studies. A primary emphasis was directed toward identifying hydrologic features that could facilitate the movement of hazardous waste contamination from the installations.

Biographical Data

SUSAN J. TIFFANY

Engineer

Personal Information

[redacted]

Education

B.S. in Civil Engineering, 1980, Massachusetts Institute of Technology
M.S. in Civil Engineering, 1981, Stanford University

Professional Affiliations

American Society of Civil Engineers
American Chemical Society
EIT - State of California No. 52332, July 15, 1981

Experience Record

1979-1980 — Meta Systems, Inc., Cambridge, MA. Staff Researcher. Researched and wrote description statements for potentially toxic chemicals. Major categories of concern were precursors, production processes, producers, uses and side effects.

Massachusetts Institute of Technology. Research Assistant. Designed and performed toxicity experiments on Daphnia magna.

1980-1981 — Massachusetts Institute of Technology, Cambridge, MA. Editing Assistant. Aided in preparation of aquatic chemistry textbook.

1982-1984 — Clement Associates, Arlington, VA. Staff Engineer. Defined extent of contamination at Superfund sites as part of Remedial Action Master Plans (RAMPs) prepared for EPA. Prepared sections of a RCRA Part B permit application for a proposed hazardous waste treatment and disposal facility. Performed on-site inspections and prepared multimedia risk

assessments of chemical manufacturing, electronics, and waste disposal facilities applying for Environmental Impairment Liability (EIL) insurance. Final assessment included analysis of facility operations, waste treatment and disposal practices, regulatory compliance and other areas of potential environmental impact. Scored selected metals and organic compounds on the basis of their persistence in air, surface, water, and groundwater for EPA's Office of Solid Waste. Results of the scoring exercise were to be included in an assessment of low-risk waste treatment strategies that integrated wastes, environments, and technologies (W-E-T), in an attempt to provide a framework for the regulation of hazardous waste facilities.

1984-Present — Engineering-Science, Inc. Staff Engineer. Responsible for gathering existing data on the removal of priority pollutants by GAC. Data will be used to assess the feasibility of meeting BATEA standards proposed for the affected industry. Involved in preparation of post-closure plans for three hazardous waste surface impoundments and a hazardous waste landfill at a military installation. Currently participating in Phase I investigations of 32 superfund sites for the State of New York.

APPENDIX B

LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS

TABLE B.1
LIST OF INTERVIEWEES

	Most Recent Position	Years of Service At This Installation
1.	Sanitary Supervisor, 97 CES	11
2.	Water Treatment Plant Operator, 97 CES	14
3.	Fire Chief, 97 CES	10
4.	Fire Chief, 97 CES (retired)	19
5.	Entomologist, 97 CES	6
6.	Foreman, Liquid Fuels Maintenance, 97 CES	29
7.	Manager, Auto Hobby Shop, 97 CSG	18
8.	NCOIC, Aerospace Ground Equipment, 97 FMS	2
9.	Supervisor, Fuels Operations Section, 97 SUP	4
10.	NCOIC, Fuels Control Center, 97 SUP	5
11.	Assistant NCOIC, Equipment Maintenance Branch, 97 MMS	1
12.	Property Disposal Specialist, DPDO	10
13.	Assistant NCOIC, Nuclear Weapons Maintenance, 97 MMS	5
14.	Day Shift Supervisor, Missile Storage and Handling, 97 MMS	2
15.	NCOIC, Corrosion Control, 97 FMS	4
16.	Fuel Vehicle Mechanic, Fuel Vehicle Maintenance, 97 TRS	4
17.	NCOIC, Defense and Fire Control, 97 AMS	6
18.	Assistant NCOIC, Non-Destructive Inspection, 97 FMS	3
19.	Staff Technician, Medical X-Ray, HOSP	20
20.	NCOIC, Dental Clinic, HOSP	1
21.	NCOIC, Accessory Repair Section, 97 FMS	4

TABLE B.1
(Continued)
LIST OF INTERVIEWEES

Most Recent Position		Years of Service At This Installation
22.	Supervisor, Tire Shop, 97 FMS	1
23.	Assistant NCOIC, Non-Powered AGE, 97 OMS	4
24.	Electrical Superintendent, Power Production, 97 CES	1
25.	NCOIC, Equipment Maintenance and Supply, 97 MMS	6
26.	Assistant NCOIC, Pneudraulics, 97 MMS	3
27.	Technical Maintenance Superintendent, Vehicle Maintenance, 97 TRS	—
28.	OIC, Vehicle Maintenance, 97 TRS	1/4
29.	NCOIC, Bioenvironmental Engineering, HOSP	3
30.	NCOIC, Munitions Maintenance - Missile Checkout, 97 MMS	8
31.	Civilian, City Public Works	—
32.	Civilian, Base Historian	1
33.	Civilian, 97 CES (retired)	1
34.	Civilian, City official	—
35.	Civilian, Manufacturing	—
36.	Civilian, Contractor	—
37.	Civilian, Carpenter, 97 CES (retired)	23
38.	Civilian, Sheet Metal, 97 CES (retired)	15
39.	Chief Engineer, 97 CES	26
40.	Civilian, Plumbing, 97 CES	26
41.	Civilian, Sanitation, 97 CES (retired)	27
42.	Civilian, Planning, 97 CES (retired)	25

TABLE B.1
(Continued)
LIST OF INTERVIEWEES

Most Recent Position	Years of Service At This Installation
43. Civilian, Pavements, 97 CES	24
44. NCOIC, Plumbing, 97 CES	12
45. Civilian, Pavement and Grounds, 97 CES (retired)	22
46. Civilian, 97 CES	27
47. Civilian, 97 CES	23
48. NCO, Pavements, 97 CES	3
49. Civilian, 97 CES	10
50. Civilian, Environmental Coordinator, 97 CES	1
51. Civilian, Real Property	14
52. Civilian, Real Property (retired)	27
53. Civilian, Electrical, 97 CES	23
54. NCO, Production Control, 97 CES	7
55. Civilian, Electrical, 97 CES	9
56. Civilian, 97 CES	23
57. Civilian, Mechanical, 97 CES	29
58. Civilian, Electrical, 97 CES	18
59. NCO, Electrical, 97 CES	3
60. Aircraft Fuels Technician, Fuel Cell Repair, 97 FMS	1
61. NCOIC, Conventional Munitions Maintenance, 97 MMS	1/3
62. NCOIC, Environmental Systems, 97 FMS	8

TABLE B.1
(Continued)
LIST OF INTERVIEWEES

Most Recent Position	Years of Service At This Installation
63. Civilian, Auto Mechanic, Vehicle Maintenance, 97 TRS	8
64. Civilian, Floor Supervisor, Allied Trades, 97 TRS	2.5
65. NCOIC, Photo Lab, 97 CSG	—
66. NCOIC, Electric Shop, 97 FMS	5
67. Civilian, Heavy Mobile Equipment Mechanic, 97 TRS	9
68. Civilian, Superintendent, Pavement and Grounds, 97 CES	20
69. Aerospace Systems Branch Chief, 97 FMS	11
70. Civilian, Power Equipment Support Mechanic, 97 CES	12
71. Civilian, Superintendent, Fuel Vehicle Maintenance, 97 TRS (retired)	20
72. NCOIC, Liquid Fuels Maintenance, 97 CES	1
73. Civilian, Contract Programmer, 97 CES	20
74. NCOIC, Medical Lab, HOSP	2
75. Civilian, Hospital Facilities Manager, HOSP	14
76. OIC, Bioenvironmental Engineering, HOSP	1
77. Fuels Superintendent Branch Chief, 97 SUP	1
78. Supervisor, Fuels Quality Control, 97 SUP	7

TABLE B.2
OUTSIDE AGENCY CONTACTS

A. H. Ludwig, Hydrologist
U.S. Geological Survey
Water Resources Division
2301 Federal Building
Little Rock, AR 72201
501/378-6391

O. A. Wise, Geologist
Arkansas Geological Commission
3815 W. Roosevelt Road
Little Rock, AR 72204
501/371-1646

John D. Ward, Manager, Permits Branch
Arkansas Department of Pollution Control and Ecology
8001 National Drive
Little Rock, AR 72209
501/562-7444

Dennis Green, Compliance and Technical Assistance Branch
Arkansas Department of Pollution Control and Ecology
8001 National Drive
Little Rock, AR 72209
501/562-7444

Robert White, General Manager
Blytheville Waterworks
P.O. Box 308
Blytheville, AR 72315
501/763-4449

W. Lewis
Modern Military Field Branch
Washington National Record Center
4025 Suitland Road
Suitland, MD
301/763-1710

J. Dwyer
Cartographic and Architectural Branch
National Archives
841 S. Pickett Street
Alexandria, VA 22304
703/756-6700

TABLE B.2
(continued)
OUTSIDE AGENCY CONTACTS

E. Reese
Modern Military Branch
National Archives
8th and Pennsylvania Avenue
Washington, DC
202/523-3340

Dave Plante
U.S. Environmental Protection Agency
Dallas, Texas 75270
214/767-2910

APPENDIX C

TENANT MISSIONS BLYTHEVILLE AFB

APPENDIX C

TENANT MISSIONS- BLYTHEVILLE AFB

Detachment 14, 26th Weather Squadron

The mission of Detachment 14, 26th Weather Squadron is to provide meteorological support as required by the 97th Bombardment wing. Provide forecasting and observing services in support of the Air Weather Service Global Weather concept and to complete special projects as directed by higher weather authorities.

2101 Communications Squadron

The mission of 2101 Communications Squadron is to provide air traffic control and maintain the navigational aids for Blytheville AFB in support of the 97th Bombardment Wing.

3904 Management Engineering Squadron

The mission of 3904 Management Engineering Squadron is to provide the capability for improved Management of USAF/SAC resources through the development of manpower standards and management engineering improvement studies and by rendering assistance to SAC Commanders in the area of manpower, organization and management advisory consulting service.

Detachment 814, Air Force Office of Special Investigation

The mission of the Air Force Office of Special Investigation provides special investigative services for dealing with crimes concerning Blytheville AFB military and civilian personnel.

Defense Property Disposal Office (DPDO)

Maintains and operates facilities to provide disposal service for the Department of Defense.

USAF Postal and Courier Service

Maintains and operates facilities to provide mail and courier service for the U.S.A.F.

USAF Hospital Blytheville

The mission of the USAF Hospital is to provide the medical support necessary to maintain the highest degree of combat readiness and effectiveness of the 97th Bomb Wing, 97 CSG, and support elements assigned to Blytheville Air Force Base, Arkansas.

APPENDIX D

SUPPLEMENTAL BASE FINDINGS INFORMATION

TABLE D.1
PETROLEUM STORAGE FACILITIES
BLYTHEVILLE AFB

Facility Number	Type of POL	Capacity	Description
103	No. 2 Fuel Oil	1,000 gallons	Underground
104	No. 2 Fuel Oil	2,000 gallons	Underground
105	No. 2 Fuel Oil	6,000 gallons	Underground
106	No. 2 Fuel Oil	2,500 gallons	Underground
107	No. 2 Fuel Oil	4,000 gallons	Underground
130	No. 2 Fuel Oil	1,200 gallons	Underground
150	No. 2 Fuel Oil	1,000 gallons	Underground
201	No. 2 Fuel Oil	2,000 gallons	Underground
202	No. 2 Fuel Oil	1,000 gallons	Underground
205	No. 2 Fuel Oil	2,000 gallons	Underground
206	No. 2 Fuel Oil	2,000 gallons	Underground
215	No. 2 Fuel Oil	10,000 gallons	Underground
218	No. 2 Fuel Oil	2,000 gallons	Underground
229	No. 2 Fuel Oil	1,500 gallons	Underground
234	No. 2 Fuel Oil	1,000 gallons	Underground
240	No. 2 Fuel Oil	1,000 gallons	Underground
250	No. 2 Fuel Oil	1,000 gallons	Underground
411	No. 2 Fuel Oil	25,000 gallons	Underground
412	No. 2 Fuel Oil	25,000 gallons	Underground
413	No. 2 Fuel Oil	25,000 gallons	Underground
433	No. 2 Fuel Oil	2-1,000 gallons ea	Underground
450	No. 2 Fuel Oil	15,000 gallons	Underground
453	No. 2 Fuel Oil	8,000 gallons	Underground
455	No. 2 Fuel Oil	20,000 gallons	Underground
457	No. 2 Fuel Oil	20,000 gallons	Underground
466	No. 2 Fuel Oil	550 gallons	Underground
467	No. 2 Fuel Oil	275 gallons	Underground

TABLE D.1
(Continued)
PETROLEUM STORAGE FACILITIES
BLYTHEVILLE AFB

Facility Number	Type of POL	Capacity	Description
468	No. 2 Fuel Oil	1,500 gallons	Underground
470	No. 2 Fuel Oil	1,500 gallons	Underground
513	No. 2 Fuel Oil	2-8,000 gallons ea	Underground
-	No. 2 Fuel Oil	1-5,000 gallons ea	Underground
522	No. 2 Fuel Oil	2,500 gallons	Underground
525	No. 2 Fuel Oil	750 gallons	Underground
551	No. 2 Fuel Oil	1,000 gallons	Underground
552	No. 2 Fuel Oil	2,000 gallons	Underground
555	No. 2 Fuel Oil	750 gallons	Underground
556	No. 2 Fuel Oil	1,000 gallons	Underground
613	No. 2 Fuel Oil	3-12,000 gallons ea	Underground
625	No. 2 Fuel Oil	2,000 gallons	Underground
630	No. 2 Fuel Oil	1,000 gallons	Underground
640	No. 2 Fuel Oil	1,000 gallons	Underground
641	No. 2 Fuel Oil	2-500 gallons	Underground
-	No. 2 Fuel Oil	1-1,000 gallons	Underground
645	No. 2 Fuel Oil	560 gallons	Underground
650	No. 2 Fuel Oil	10,000 gallons	Underground
700	No. 2 Fuel Oil	1,500 gallons	Underground
702	No. 2 Fuel Oil	2,000 gallons	Underground
800	No. 2 Fuel Oil	575 gallons	Underground
1205	No. 2 Fuel Oil	550 gallons	Underground
1212	No. 2 Fuel Oil	1,500 gallons	Underground
1213	No. 2 Fuel Oil	6,000 gallons	Underground
1214	No. 2 Fuel Oil	3,500 gallons	Underground
1218	No. 2 Fuel Oil	1,150 gallons	Underground
1225	No. 2 Fuel Oil	1,000 gallons	Underground
1242	No. 2 Fuel Oil	1,000 gallons	Underground

TABLE D.1
(Continued)
PETROLEUM STORAGE FACILITIES
BLYTHEVILLE AFB

Facility Number	Type of POL	Capacity	Description
1285	No. 2 Fuel Oil	6,000 gallons	Underground
1288	No. 2 Fuel Oil	4,000 gallons	Underground
1303	No. 2 Fuel Oil	1,500 gallons	Underground
1305	No. 2 Fuel Oil	500 gallons	Underground
1215	Propane	250 gallons	Above Ground
1220	Propane	250 gallons	Above Ground
1229	Propane	2-250 gallons ea	Above Ground
1244	Propane	2-250 gallons ea	Above Ground
1308	Propane	250 gallons	Above Ground
160	Mogas	2-10,000 gallons ea	Underground
-	Mogas	6,000 gallons	Underground
209	Mogas	2,000 gallons	Underground
211	Mogas	1,000 gallons	Underground
410	Mogas	25,000 gallons	Underground
460	Mogas	12,000 gallons	Underground
486	Mogas	10,000 gallons	Underground
210	JP-4	2,000 gallons	Underground
320	JP-4	2,500 gallons	Above Ground
481	JP-4	20,000 barrels	Above Ground, diked
484	JP-4	30,000 barrels	Above Ground, diked
1020	JP-4	4-50,000 gallons ea	Underground
1232	JP-4	4-50,000 gallons ea	Underground
1234	JP-4	4-50,000 gallons ea	Underground
1303	JP-4	2,500 gallons	Above Ground

TABLE D.1
(Continued)
PETROLEUM STORAGE FACILITIES
BLYTHEVILLE AFB

Facility Number	Type of POL	Capacity	Description
1320	JP-4	4-50,000 gallons ea	Underground
1285	JP-9	3-7,000 gallons ea	Underground
461	Diesel	10,000 gallons	Underground
1249	Diesel	3,000 gallons	Underground
1279	Diesel	3,000 gallons	Underground
1344	Waste Oil	4-4,000 gallons ea	Underground

Source: Blytheville AFB Spill Prevention and Response Plan, January 1984.

TABLE D.2

PESTICIDES CURRENTLY USED AT BLYTHEVILLE AFB

Insecticides	Herbicides
Abate	Amine 2-4-D
Baygon 2% Dust	Ammonium Hydroxide
Carbamate 1.5	Dowpon M. Grass Killer
Chlordane 72%	Hywar X-L Weed Killer
Dursbane EC	Diquat Water Weed Killer
Dursban LO	Pramitol Pellets
Diazinon Dust	Pramitol 25E
Diazinon EC	Kerb
D-Phenothrin 2%	Surfacon +2851
Lindane	
Malathion EC	Rodenticides
Malathion Tech Grade	Anticoagulent
R-55 Repellent	Talon-G

Source: BAFB personnel

TABLE D.3
SELECTED SURFACE WATER QUALITY ANALYSIS

Location	Sample Date	Chemical Oxygen Demand	Oil and Grease	Ammonia	Nitrate[2] (10)	Nitrite	Phosphorus	Chloride (250)	Fluoride (1.4-2.4)	Sulfate (250)	MBAS (0.5)	Turbidity (1-5 units)
Ditch No. 25	March 1980	10	0.3	1.1	0.7	0.02	0.5	4.0	0.1	15	0.1	155
	Sept. 1980	12	0.4	0.3	NA	0.02	NA	1.0	NA	7	0.1	5.5
	March 1981	30	2.4	0.2	0.1	0.02	NA	4	NA	24	0.1	145
	Sept. 1981	10	0.3	0.8	0.1	0.02	NA	12	NA	NA	NA	NA
	March 1982	40	0.3	0.35	0.1	0.02	1.2	NA	NA	NA	0.1	26
	Sept. 1982	46	0.3	0.72	NA[3]	NA	1.0	NA	NA	NA	NA	NA
	March 1983	15	0.6	0.9	0.4	NA	0.4	NA	NA	NA	0.1	54
	Sept. 1983	-[4]	-	-	-	-	-	-	-	-	-	-
	March 1984	-	-	-	-	-	-	-	-	-	-	-
	Sept. 1984	-	-	-	-	-	-	-	-	-	-	-
Pemiscot Bayou at Golf Course	March 1980	NA	0.3	1.2	0.8	0.02	0.6	4.0	0.1	8.0	0.1	250
	Sept. 1980	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1981	18	0.3	0.7	NA	0.02	NA	16	NA	13	0.1	27
	Sept. 1981	NA	NA	NA	NA	NA	NA	12	NA	NA	NA	NA
	March 1982	32	0.3	0.63	NA	0.02	0.4	NA	NA	NA	0.1	40
	Sept. 1982	19	0.3	1.54	NA	0.02	0.52	NA	NA	NA	0.1	29
	March 1983	20	3.2	2.2	0.3	NA	0.2	NA	NA	NA	<0.1	50
	Sept. 1983	40	5.0	NA	NA	NA	0.19	NA	8	NA	NA	NA
	March 1984	-	-	-	-	-	-	-	-	-	-	-
	Sept. 1984	<10	<0.5	NA	NA	NA	<0.2	NA	<8	NA	NA	NA
Pemiscot Bayou at Highway 151 Bridge	March 1980	20	0.3	0.5	0.2	0.02	0.5	1	0.1	13	0.1	155
	Sept. 1980	30	NA	0.6	NA	0.02	NA	NA	NA	NA	NA	NA
	March 1981	12	0.4	1.3	0.1	0.02	NA	8	NA	16	0.1	15
	Sept. 1981	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1982	10	0.3	1.13	0.1	0.02	0.36	NA	NA	NA	NA	NA
	Sept. 1982	20	10.1	0.82	NA	NA	0.66	NA	NA	NA	0.1	8
	March 1983	13	0.7	1.7	0.4	NA	0.2	NA	NA	NA	<0.1	24
	Sept. 1983	10	<0.3	NA	NA	NA	0.25	4.0	NA	NA	NA	NA
	March 1984	-	-	-	-	NA	-	-	-	-	-	-
	Sept. 1984	10	<0.3	NA	NA	NA	0.2	12	NA	NA	NA	NA
Wastewater Plant Discharge	March 1980	20	0.3	NA	NA	NA	12	12	0.4	11	0.1	130
	Sept. 1980	12	NA	0.5	NA	0.02	NA	NA	NA	NA	NA	NA
	March 1981	28	0.3	0.3	12.5	0.02	20	20	NA	34	0.3	3
	Sept. 1981	10	0.5	0.7	6.0	0.02	20	20	NA	NA	NA	NA
	March 1982	21	0.3	1.55	NA	0.02	NA	NA	NA	NA	0.2	8
	Sept. 1982	17	0.3	1.8	NA	0.4	NA	NA	NA	NA	0.1	35
	March 1983	22	0.6	1.2	0.8	NA	0.8	NA	NA	NA	<0.1	125
	Sept. 1983	20	2.2	NA	NA	NA	5.0	24	NA	NA	NA	NA
	March 1984	55	6.5	NA	NA	NA	6.2	28	NA	NA	NA	NA
	Sept. 1984	20	1.2	NA	NA	NA	6.8	4.0	NA	NA	NA	NA

TABLE D.3
(Continued)
SELECTED SURFACE WATER QUALITY ANALYSIS

Location	Sample Date	Cyanide	Phenols	Arsenic (0.05)	Cadmium (0.01)	Chromium (0.05)	Chromium (Hexavalent)	Copper (1)	Iron (0.3)	Lead (0.05)	Manganese (0.05)	Mercury (0.002)
Ditch No. 25	March 1980	0.01	NA	.010	.010	.050	.050	.020	6.80	.050	.307	.005
	Sept. 1980	0.01	.010	.010	.010	.050	.050	.020	1.96	.050	.148	.005
	March 1981	NA	.010	.010	.010	.050	.050	.092	1.00	.050	.750	.005
	Sept. 1981	NA	NA	.010	.010	.050	.050	.054	1.77	.050	.564	.005
	March 1982	NA	.010	NA	NA	.050	NA	.020	2.73	.050	NA	.005
	Sept. 1982	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1983	NA	.056	NA	NA	<.050	<.050	NA	NA	NA	NA	NA
	Sept. 1983	-	-	-	-	-	-	-	-	-	-	-
	March 1984	-	-	-	-	-	-	-	-	-	-	-
	Sept. 1984	-	-	-	-	-	-	-	-	-	-	-
Pemiscot Bayou at Golf Course	March 1980	0.01	.010	.010	.010	.050	.050	.020	6.27	.050	.509	.005
	Sept. 1980	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1981	NA	.010	.010	.010	.050	.050	.210	3.10	.050	.750	.005
	Sept. 1981	0.01	NA	.013	.010	.050	.050	.020	1.07	.050	.528	.005
	March 1982	NA	.010	NA	NA	.050	.050	NA	3.18	.050	NA	.005
	Sept. 1982	NA	.010	NA	NA	.050	.050	NA	NA	NA	NA	NA
	March 1983	NA	.020	NA	NA	<.050	<.050	NA	NA	NA	NA	NA
	Sept. 1983	NA	.016	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1984	-	-	-	-	-	-	-	-	-	-	-
	Sept. 1984	NA	<.010	NA	NA	<.050	<.050	NA	NA	NA	NA	NA
Pemiscot Bayou at Highway 151 Bridge	March 1980	0.01	.010	.010	.010	.050	.050	.020	6.33	.050	5.34	.005
	Sept. 1980	0.01	NA	.010	.010	.050	NA	NA	NA	NA	NA	NA
	March 1981	0.01	.010	.010	.010	.050	.050	.140	2.50	.050	.650	.005
	Sept. 1981	0.01	.010	NA	NA	.050	.050	.020	3.05	.050	.619	.005
	March 1982	NA	.010	NA	NA	.050	.050	NA	2.35	.050	NA	.005
	Sept. 1982	NA	.010	NA	NA	<.050	.050	NA	NA	NA	NA	NA
	March 1983	NA	.034	NA	NA	<.050	<.050	NA	NA	NA	NA	NA
	Sept. 1983	NA	.010	NA	NA	<.050	<.050	NA	NA	NA	NA	NA
	March 1984	-	-	-	-	-	-	-	-	-	-	-
	Sept. 1984	NA	.010	NA	NA	<.050	<.050	NA	NA	NA	NA	NA
Wastewater Plant Discharge	March 1980	0.01	0.01	0.01	0.01	.050	.050	.020	2.00	.050	.252	.005
	Sept. 1980	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1981	0.02	0.01	0.01	0.01	.050	.050	.077	0.38	.050	.050	.005
	Sept. 1981	0.01	NA	0.01	0.01	.050	.050	.020	1.21	.050	.263	.005
	March 1982	NA	0.01	NA	NA	.050	NA	.020	2.32	.050	NA	.005
	Sept. 1982	NA	0.01	NA	NA	.050	.050	NA	NA	NA	NA	NA
	March 1983	NA	NA	NA	NA	<.050	<.050	NA	NA	NA	NA	NA
	Sept. 1983	NA	<0.01	NA	NA	<.050	<.050	NA	NA	NA	NA	NA
	March 1984	NA	<0.01	NA	NA	<.050	<.050	NA	NA	NA	NA	NA
	Sept. 1984	NA	<0.01	NA	NA	<.050	<.050	NA	NA	NA	NA	NA

TABLE D.3
(Continued)
SELECTED SURFACE WATER QUALITY ANALYSIS

Location	Sample Date	Nickel	Selenium (0.01)	Silver (0.05)	Zinc (5)	Calcium	Magnesium	Potassium	Sodium	Beryllium
Ditch No. 25	March 1980	.050	.010	.010	.051	8.8	2.5	110	2.5	NA
	Sept. 1980	.050	NA	.010	.050	10.6	.28	2.8	6.0	NA
	March 1981	.060	NA	.010	.088	19.6	5.3	3.8	17.3	NA
	Sept. 1981	.050	NA	.010	.050	47	17.3	5.4	23.9	NA
	March 1982	.050	NA	.010	.050	2	NA	NA	NA	NA
	Sept. 1982	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1983	NA	NA	NA	NA	NA	NA	NA	NA	<0.01
	Sept. 1983	-	-	-	-	-	-	-	-	-
	March 1984	-	-	-	-	-	-	-	-	-
	Sept. 1984	-	-	-	-	-	-	-	-	-
Pemiscot Bayou at Golf Course	March 1980	.050	.010	.010	.050	19.5	5.7	3.0	16.9	NA
	Sept. 1980	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1981	.053	NA	.010	.095	57.1	17.9	4.6	21.4	NA
	Sept. 1981	.050	NA	.010	.050	37.2	11.3	5.2	32.1	NA
	March 1982	.050	NA	.010	NA	NA	NA	NA	NA	NA
	Sept. 1982	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1983	NA	NA	NA	NA	NA	NA	NA	NA	<0.01
	Sept. 1983	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1984	-	-	-	-	-	-	-	-	-
	Sept. 1984	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pemiscot Bayou at Highway 151 Bridge	March 1980	.050	.010	.010	.050	20	5.9	3.1	8.4	NA
	Sept. 1980	.066	NA	.010	NA	NA	NA	NA	NA	NA
	March 1981	.050	NA	.010	.050	47.2	15.7	5.1	26.3	NA
	Sept. 1981	.050	NA	.010	.050	25.2	5.8	10.7	32.8	NA
	March 1982	NA	NA	NA	.050	NA	NA	NA	NA	NA
	Sept. 1982	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1983	NA	NA	NA	NA	NA	NA	NA	NA	<.010
	Sept. 1983	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1984	-	-	-	-	-	-	-	-	-
	Sept. 1984	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wastewater Plant Discharge	March 1980	.050	.010	.010	.050	20.5	4.8	6.0	44.2	NA
	Sept. 1980	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1981	.061	NA	.010	.140	19.2	2.1	8.4	59.6	NA
	Sept. 1981	.050	NA	.010	.050	35.9	8.5	7.3	42.9	NA
	March 1982	.050	NA	.010	.050	NA	NA	NA	NA	NA
	Sept. 1982	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1983	NA	NA	NA	NA	NA	NA	NA	NA	<.010
	Sept. 1983	NA	NA	NA	NA	NA	NA	NA	NA	NA
	March 1984	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sept. 1984	NA	NA	NA	NA	NA	NA	NA	NA	NA

APPENDIX E

MASTER LIST OF SHOPS

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
BLYTHEVILLE AFB

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Waste Management Practices
97 Field Maintenance Squadron (FMS)				
Accessory Repair	105	Yes	Yes	Underground CES tanks, then contract disposal off base.
Aerospace Ground Equipment	203	Yes	Yes	Underground CES tanks, then contract disposal off base; O/W separator to sanitary sewer.
Environmental Systems	207	Yes	No[1]	--
Wheel & Tire	207	Yes	Yes	O/W separator to sanitary sewer.
Electric Shop	215	Yes	Yes	DPDO
Structural Repair	215	Yes	No	--
Welding Shop	215	Yes	No	--
Machine Shop	215	Yes	No	--

[1] Hazardous materials are consumed in process.

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
BLYTHEVILLE AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Waste Management Practices
Pneudraulics	215	Yes	Yes	Underground CES tanks, then contract disposal off base.
Survival Equipment	218	Yes	No	--
Non-Destructive Inspection	449	Yes	Yes	Photo lab for silver recovery; DPDO.
Corrosion Control	455	Yes	Yes	O/W separator to sanitary sewer; DPDO.
Fuel Cell Repair	457	Yes	Yes	Underground CES tanks, then contract disposal off base; reclamation.
Test Cell	1303	Yes	Yes	Sanitary sewer.
97 Organizational Maintenance Squadron (OMS)				
Non-Powered AGE	106	Yes	Yes	O/W separator to sanitary sewer; underground CES tanks, then contract disposal off base.

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
BLYTHEVILLE AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Waste Management Practices
97 Civil Engineering Squadron (CES)				
Fire Extinguisher Maintenance	100	No	No	--
Liquid Fuels Maintenance	470	Yes	Yes	Underground CES tanks, then contract disposal off base.
Refrigeration	470	Yes	No	--
Carpenter Shop	470	Yes	No	--
Plumbing	471	Yes	No	--
Power Production	471	Yes	Yes	Underground CES tanks, then to contract disposal off base.
Pavement & Grounds	471/473	Yes	Yes	Underground CES tanks, then to contract disposal off base.
Entomology	1003/1014	Yes	Yes	Sanitary landfill.

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
BLYTHEVILLE AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Waste Management Practices
Sanitation	1007	Yes	No	--
97 Munitions Maintenance Squadron (MMS)				
Conventional Munitions	1205	Yes	Yes	Exploded/ burned and buried in EOD area.
Storage & Handling	1212	Yes	No	--
Nuclear Weapons Maintenance	1213 (was 1212)	Yes	Yes	Underground CES tanks, then contract disposal off base.
VACE	1285	Yes	Yes	Accumulated in drum at shop.
Missile Checkout	1285	Yes	Yes	Reclamation.
Missile Maintenance & Inspection	1285	No	No	--
Equipment Maintenance	1288 (was 105)	Yes	Yes	Underground CES tanks, then contract disposal off base.

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
BLYTHEVILLE AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Waste Management Practices
2101 Communications				
Radio Maintenance	229	Yes	No	--
Radar Maintenance	229	Yes	No	--
97 Transportation				
Fire Vehicle Maintenance	100	Yes	Yes	Underground CES tanks, then contract disposal off base.
Fuel Vehicle Maintenance	467	Yes	Yes	Reclamation; O/W separator to sanitary sewer; underground CES tanks, then contract disposal off base.
General Vehicle Maintenance	468	Yes	Yes	DPDO, O/W separator to sanitary sewer; underground CES tanks, then to contract disposal off base.
Allied Trades	468	Yes	No	--

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
BLYTHEVILLE AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Waste Management Practices
97 Supply Squadron				
Fuels Laboratory	498	Yes	Yes	Reclamation.
97 Combat Support Group (CSG)				
Photo Lab	150	Yes	Yes	Silver recovery, then to sanitary sewer.
Auto Hobby Shop	237	Yes	Yes	Contract disposal off base.
Small Arms Range	1300/1308	Yes	No	--
97 Consolidated Headquarters Squadron (CHS)				
Wood Hobby Shop	237	Yes	No	--

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
BLYTHEVILLE AFB
(Continued)

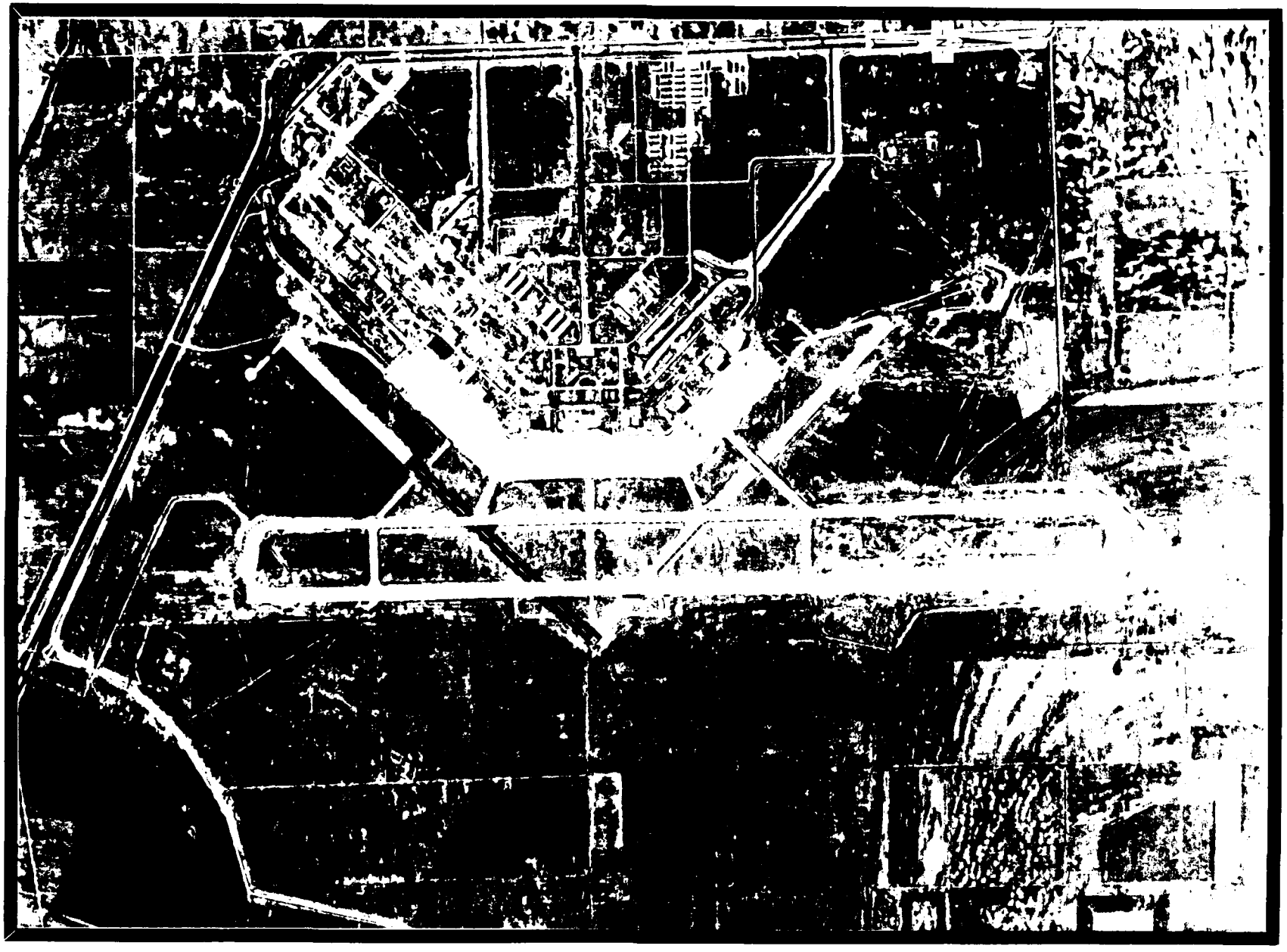
Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Waste Management Practices
USAF Hospital (HOSP)				
Dental Lab	234	Yes	Yes	DPDO
Dental Clinic	234	Yes	Yes	Sanitary sewer; silver recovery to DPDO.
Medical Maintenance	650	No	No	--
Medical X-Ray	650	Yes	Yes	Silver recovery to sewer.
Medical Laboratory	650	Yes	Yes	Sanitary sewer; incineration.
97 Bombardment Wing (BMW)				
Aircrew Life Support	107	Yes	No	--
97 Avionics Maintenance Squadron (AMS)				
Precision Management Equipment Lab	130	Yes	No	--
Defense & Fire Control	130	Yes	Yes	DPDO
Radar Shop	130	Yes	No	--

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
BLYTHEVILLE AFB
(Continued)

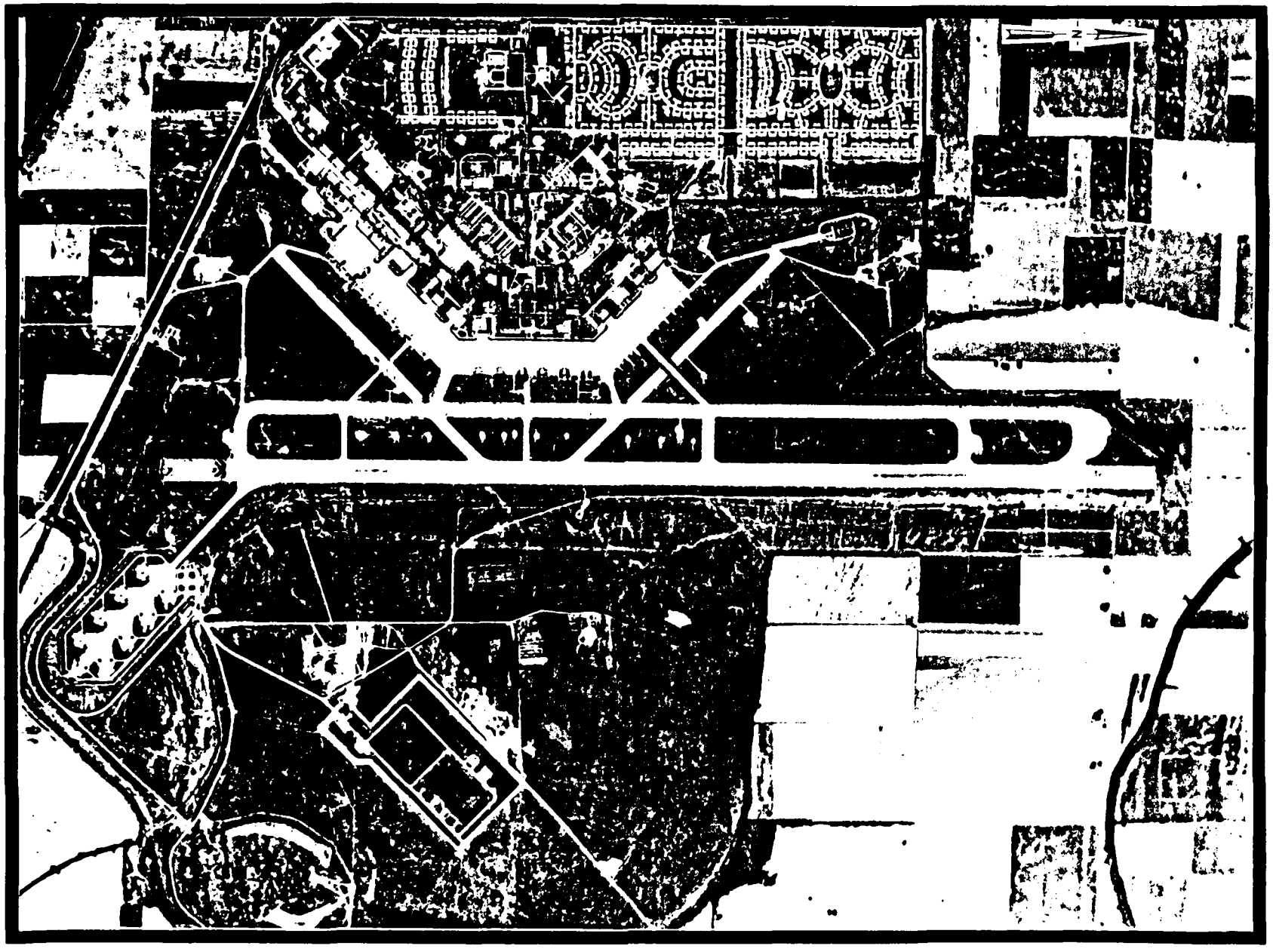
Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Waste Management Practices
Radio Shop	130	Yes	No	--
Auto Pilot	130	Yes	No	--
Electronic Counter-measures	130	Yes	No	--
Instrument	130	Yes	No	--
Offensive Avionics Systems	130	Yes	No	--
Doppler	130	Yes	No	--

APPENDIX F

PHOTOGRAPHS



BLYTHEVILLE AFB, ARKANSAS ***CIRCA 1955***



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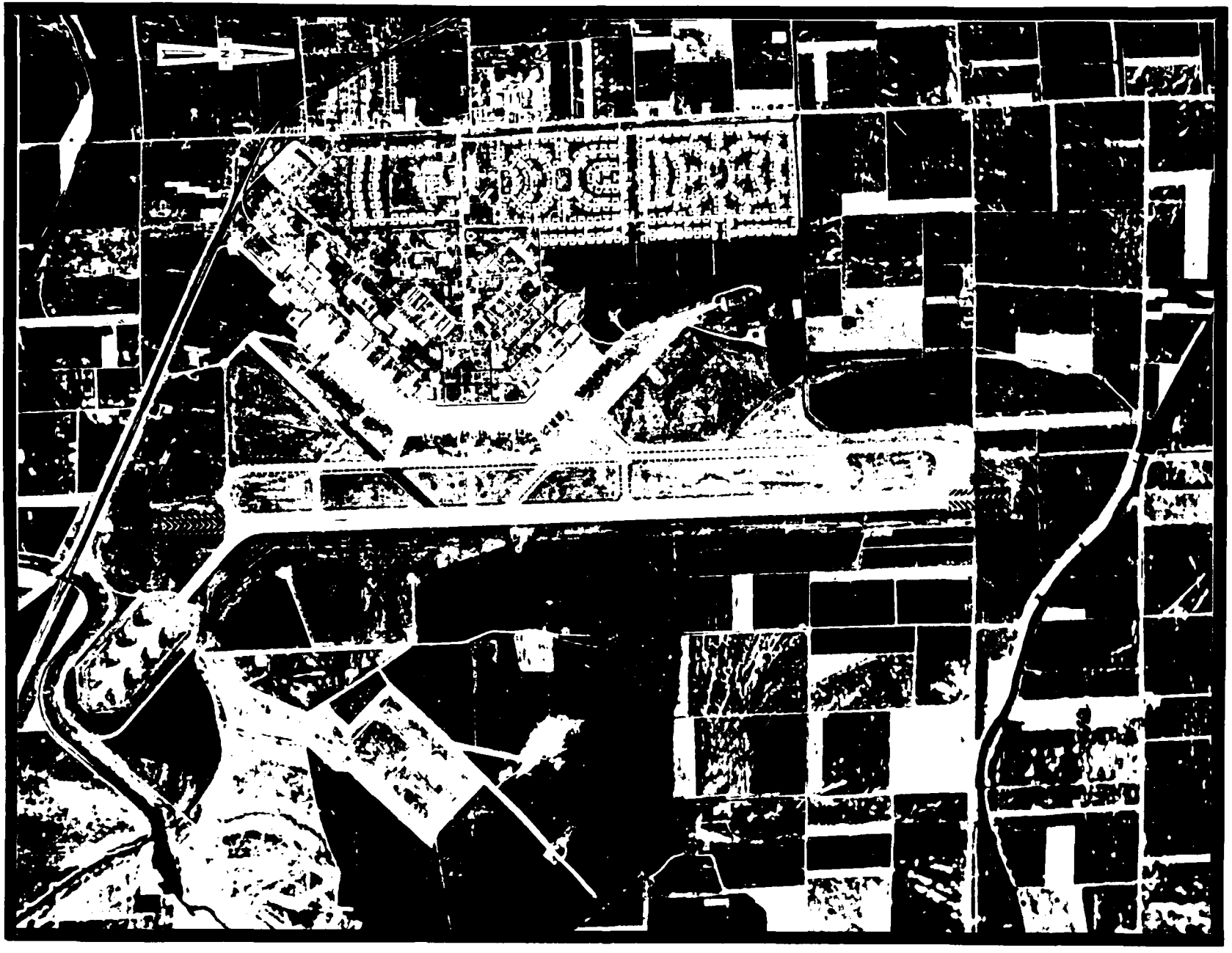

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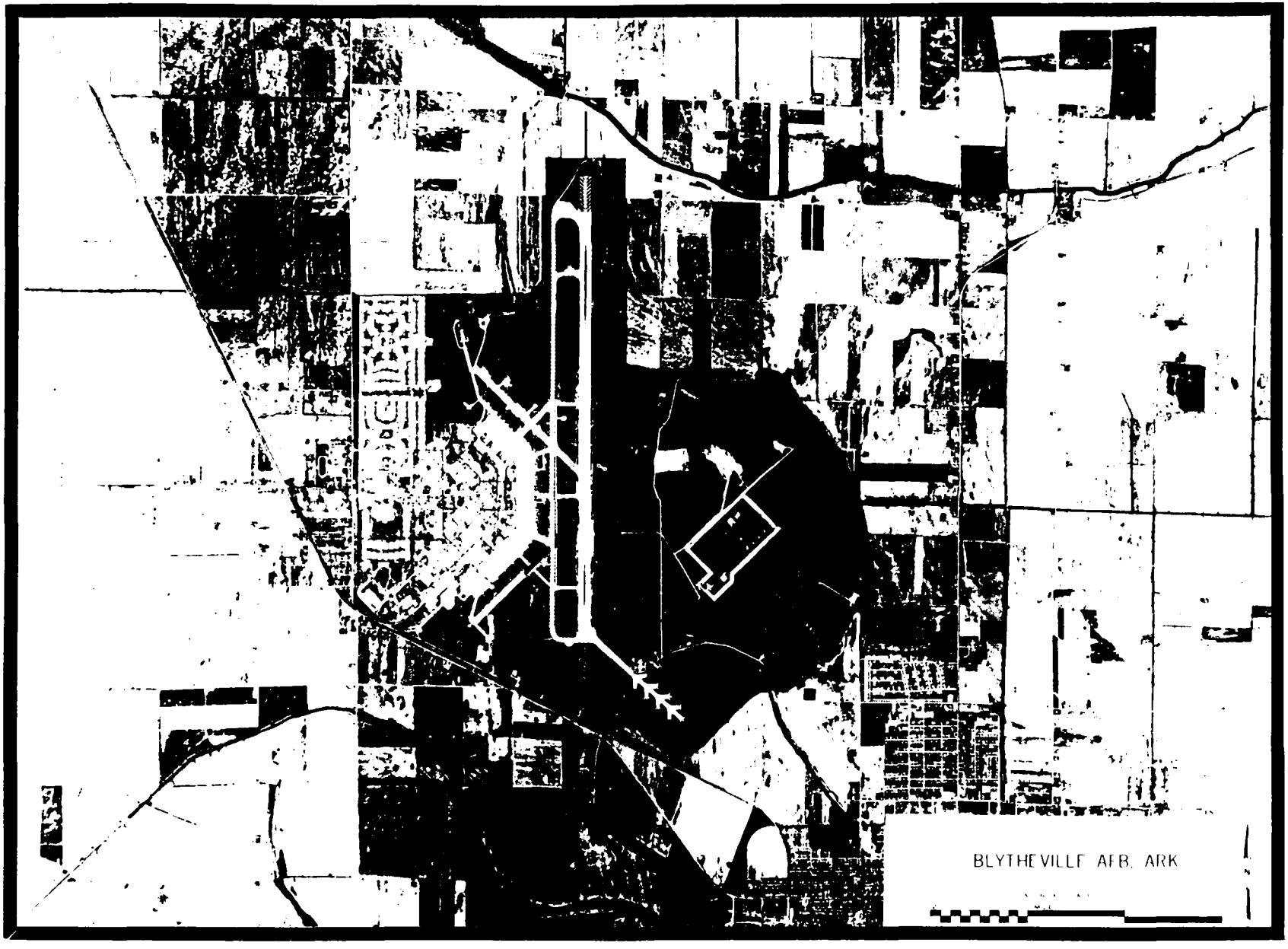
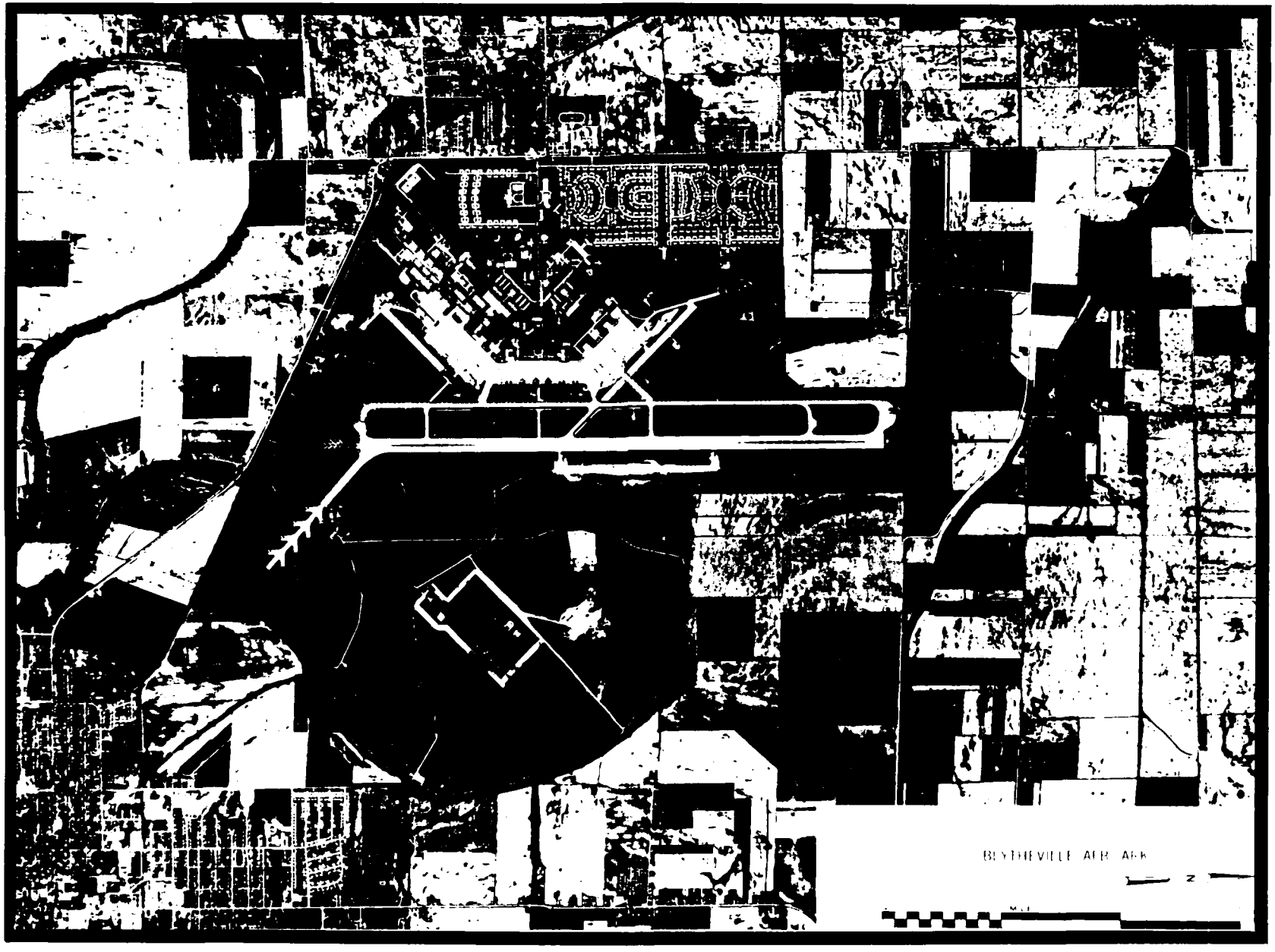
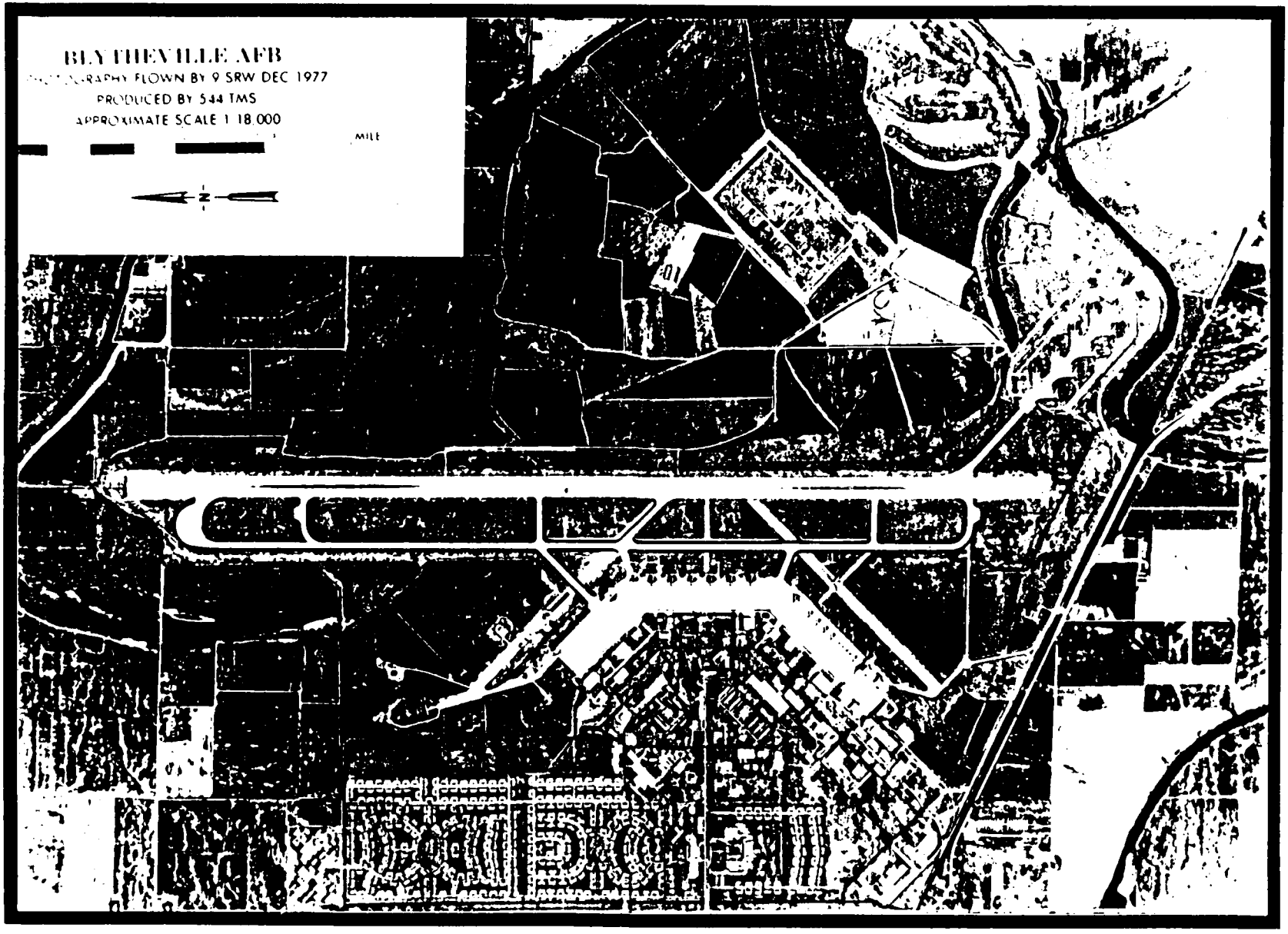


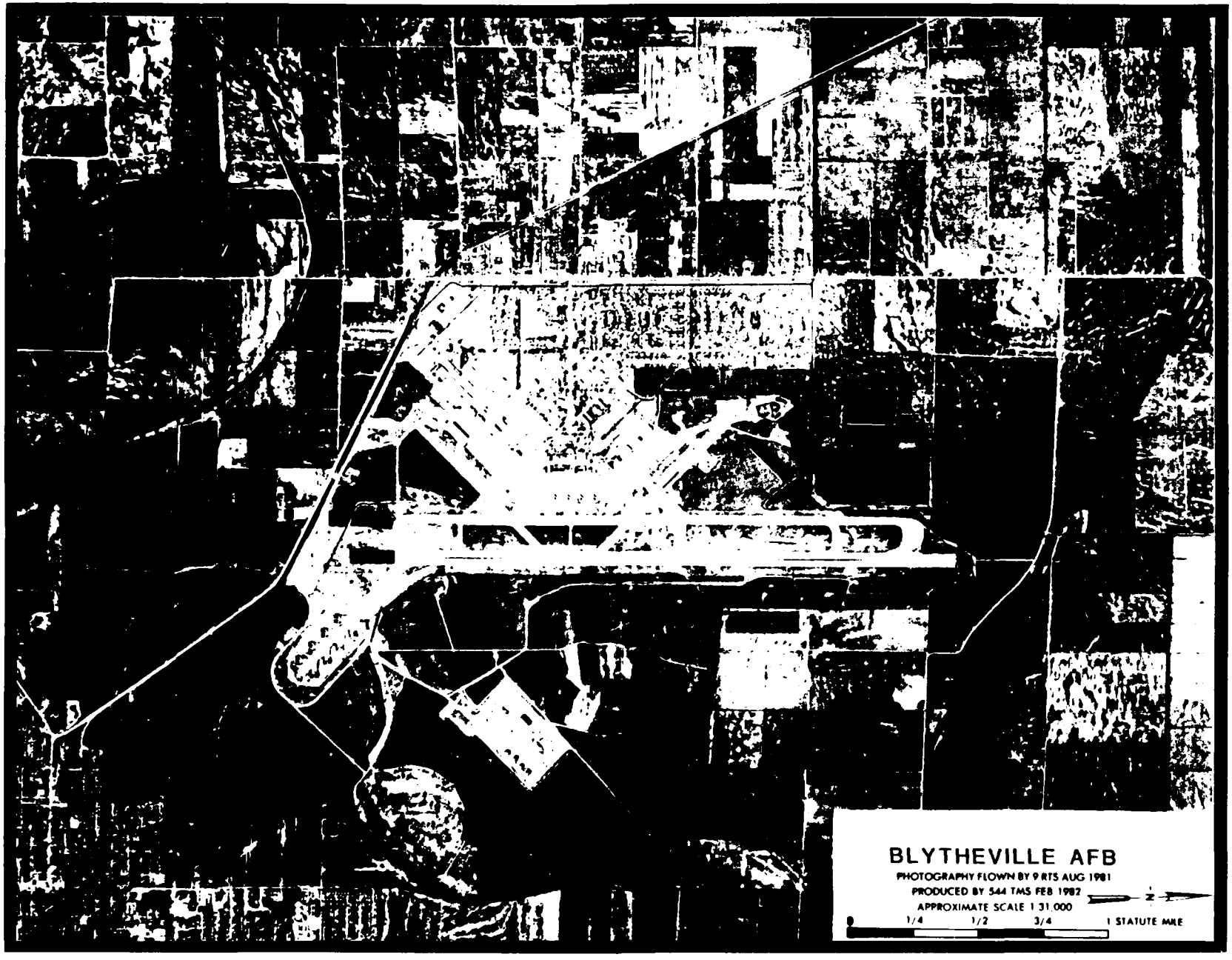
BLYTHEVILLE AFB, ARKANSAS ***CIRCA 1968***



BLYTHEVILLE AFB, ARKANSAS ***CIRCA 1970***



BLYTHEVILLE AFB, ARKANSAS **CIRCA 1977**

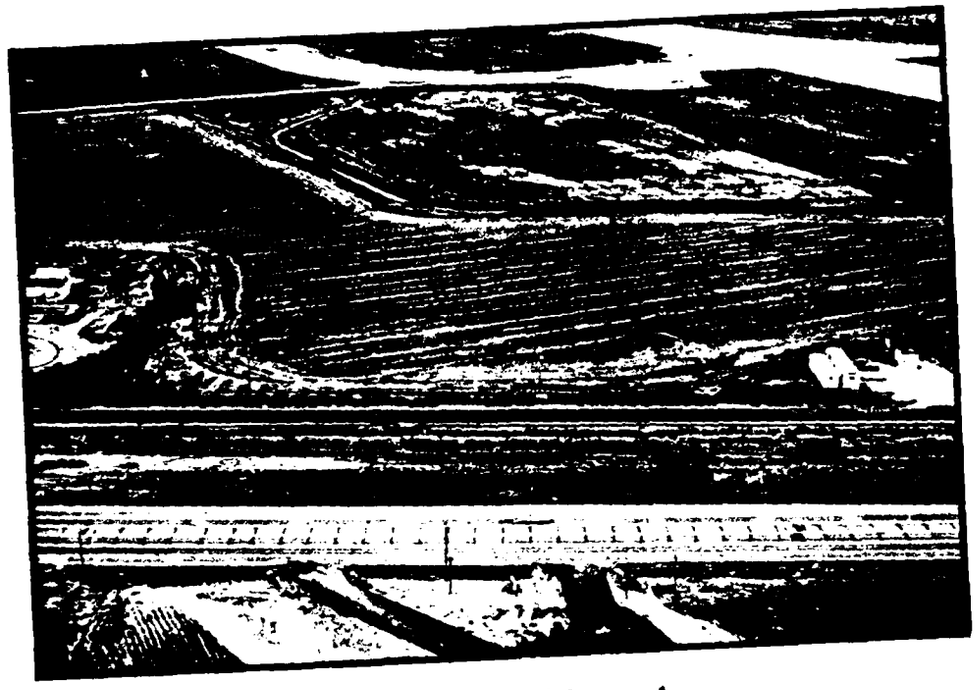


BLYTHEVILLE AFB, ARKANSAS **CIRCA 1981**

BLYTHEVILLE AFB

Fire Protection Training Area
(FACING EAST)

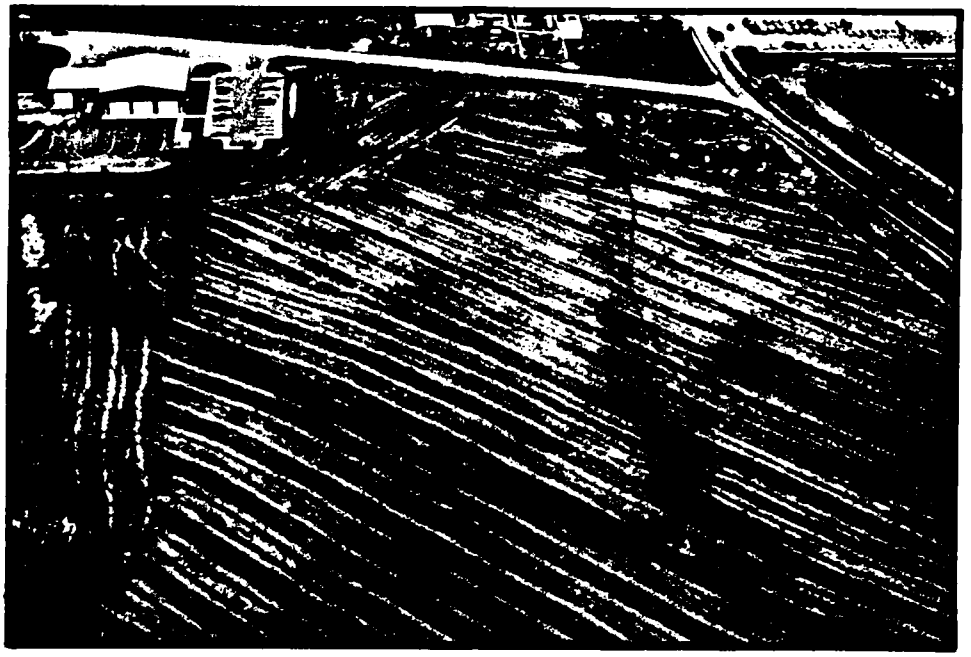
Fire Protection Training Area
(FACING NORTH)



Landfill No. 1
(FACING EAST)

Landfill No. 2
(FACING SOUTH)

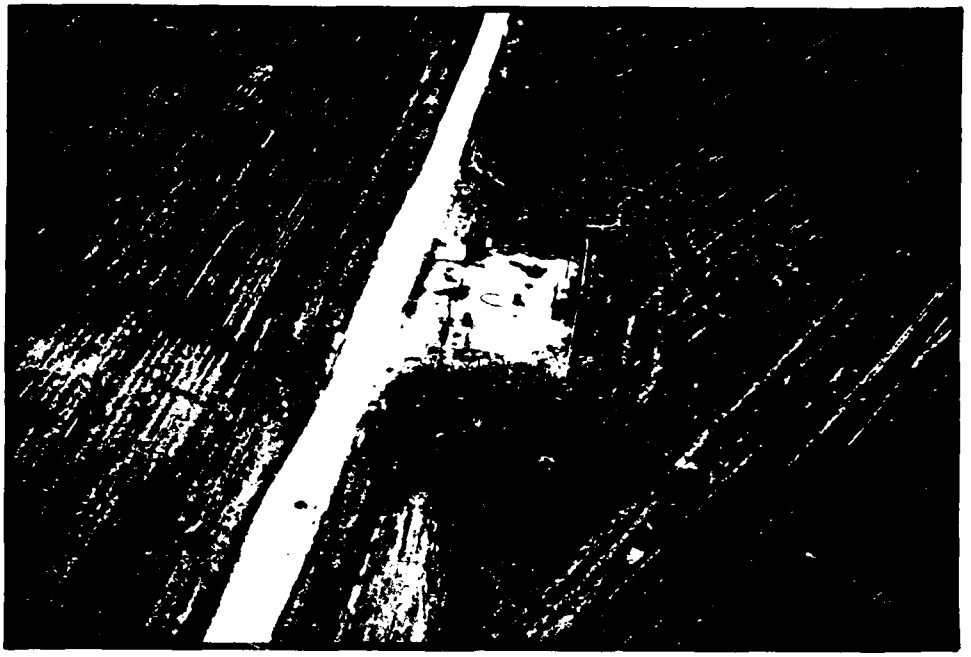
BLYTHEVILLE AFB



Landfill No. 3
(FACING SOUTH)

Landfill No. 4
(FACING WEST)

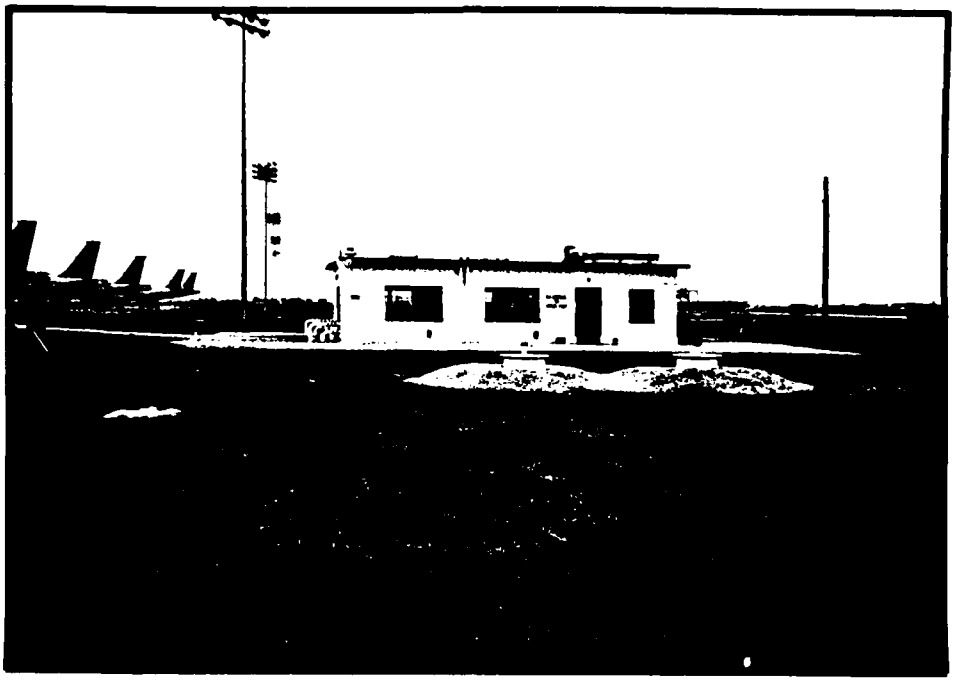
BLYTHEVILLE AFB



Underground Waste Oil Tanks
(FACING NORTH)

Underground Waste Oil Tanks
(FACING NORTH)

BLYTHEVILLE AFB



Spill Site No. 1
(FACING EAST)

Spill Site No. 2
(FACING WEST)

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM

HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with represenatives from USAF Occupational and Environmental Health Laboratory (OEHL), Air Force Engineering and Services Center (AFESC), Engineering-Science (ES) and CH2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering-Science, and CH2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of the IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Records Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

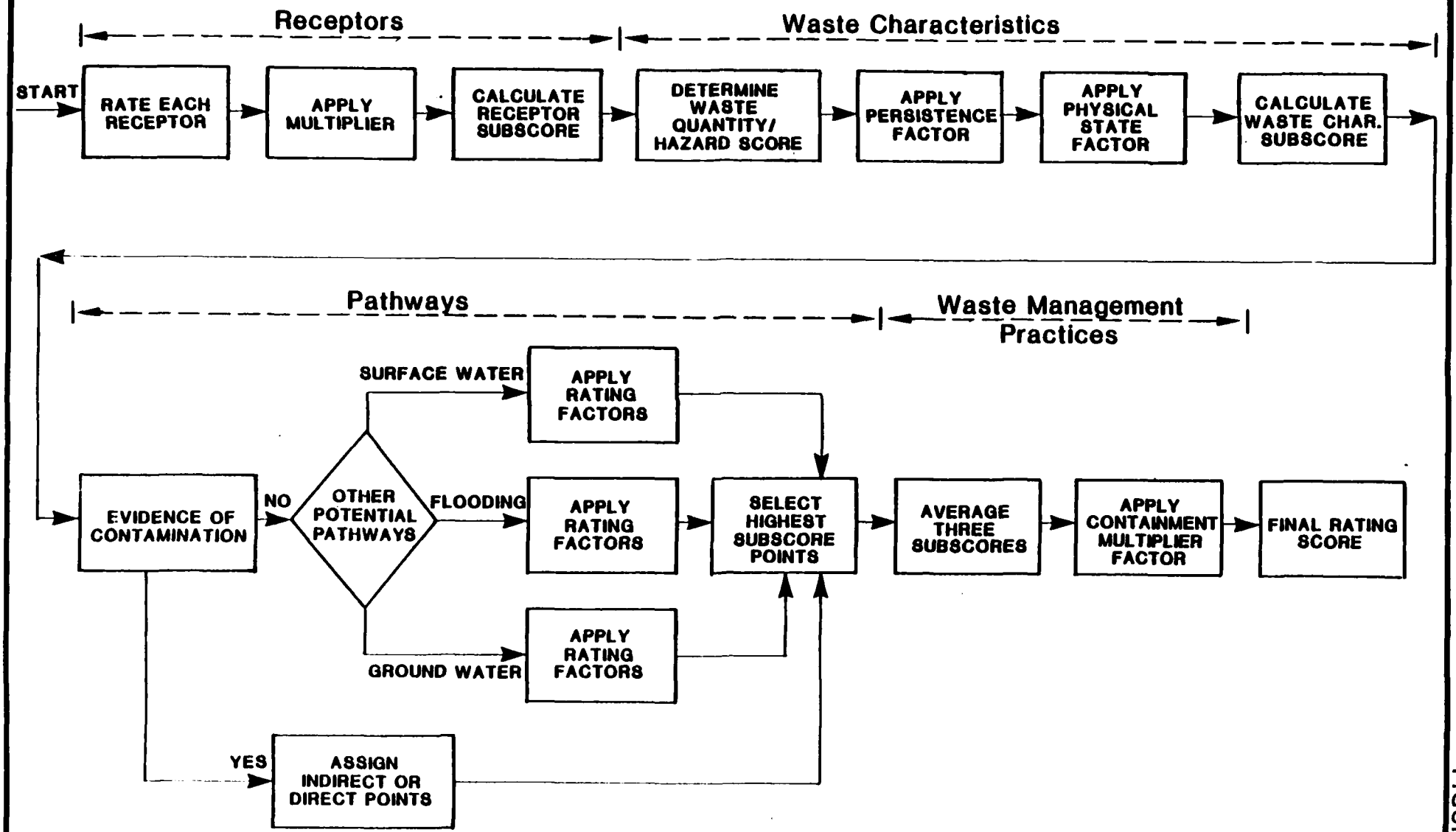


FIGURE 1

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE _____

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	_____	_____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) _____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____
2. Confidence level (C = confirmed, S = suspected) _____
3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix) _____

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	_____	_____

Subscore (100 X factor score subtotal/maximum score subtotal) _____

2. Flooding

Flooding		1		

Subscore (100 x factor score/3) _____

3. Ground-water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		3		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	_____	_____

Subscore (100 x factor score subtotal/maximum score subtotal) _____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore _____

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors _____
Waste Characteristics _____
Pathways _____

Total _____ divided by 3 = _____
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = _____

TABLE 1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, industrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1 - 50	51 - 1,000	Greater than 1, 000	6

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (<5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (>20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

Hazard Category	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
- o Confirmed confidence levels (C) can be added
- o Suspected confidence levels (S) can be added
- o Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating
- o Wastes with the same hazard rating can be added
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., *MCM + SCH = LCM* if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8

B-2 POTENTIAL FOR FLOODING

Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1

B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION

Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence fissures,	No evidence of risk	Low risk	Moderate risk	High risk	8

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Proection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III B-1, then leave blank for calculation of factor score and maximum possible score.

APPENDIX H

INDEX FOR HAZARDOUS ASSESSMENT

METHODOLOGY FORMS

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Fire Protection Training Area
Location: North of Flightline
Date of Operation: 1955 to present
Owner/Operator: Blytheville AFB
Comments/Description: Burned fuel oil, JP - 4, waste solvents

Site Rated by: E.J.Schroeder; R.S.McLeod; S.J.Tiffany

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			98	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 54

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (small, medium, or large) L = large
2. Confidence level (confirmed or suspected) C = confirmed
3. Hazard rating (low, medium, or high) H = high

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.90 = 90

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

90 x 1.00 = 90

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			80	108
Subscore (100 x factor score subtotal/maximum score subtotal)				74
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			44	114
Subscore (100 x factor score subtotal/maximum score subtotal)				39

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 74

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	54		
Waste Characteristics	90		
Pathways	74		
Total	218	divided by 3 =	73 Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

73	x	1.00	=	73
				FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Spill Site No. 2
Location: Junction North and South access roads
Date of Operation: 1973,1974
Owner/Operator: Blytheville AFB
Comments/Description: Underground pipe leak in JP-4 Hydrant system

Site Rated by: E.J.Schroeder; R.S.McLeod; S.J.Tiffany

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			104	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 58

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (small, medium, or large) L = large
2. Confidence level (confirmed or suspected) C = confirmed
3. Hazard rating (low, medium, or high) H = high

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			88	108
Subscore (100 x factor score subtotal/maximum score subtotal)				81
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			36	114
Subscore (100 x factor score subtotal/maximum score subtotal)				32

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 81

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		58	
Waste Characteristics		80	
Pathways		81	
Total	219	divided by 3 =	73 Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

73 x 1.00 = \ 73 \ FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Spill Site No. 1
Location: Northwest of building 1235
Date of Operation: 1973,1974
Owner/Operator: Blytheville AFB
Comments/Description: Underground pipe leak in JP-4 Hydrant system

Site Rated by: E.J.Schroeder; R.S.McLeod; S.J.Tiffany

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			98	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 54

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (small, medium, or large) L = large
2. Confidence level (confirmed or suspected) C = confirmed
3. Hazard rating (low, medium, or high) H = high

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.80 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	1	8	8	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			72	108
Subscore (100 x factor score subtotal/maximum score subtotal)				67
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			36	114
Subscore (100 x factor score subtotal/maximum score subtotal)				32

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	54		
Waste Characteristics	80		
Pathways	67		
Total	201	divided by 3 =	67 Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

67 x 1.00 = \ 67 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Spill Site No. 3
Location: East side of runway between taxiway C & D
Date of Operation: 1981
Owner/Operator: Blytheville AFB
Comments/Description: JP - 4 fuel spill when KC - 135 ran off taxiway D

Site Rated by: E.J.Schroeder; R.S.McLeod; S.J.Tiffany

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			84	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 47

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (small, medium, or large) M = medium
2. Confidence level (confirmed or suspected) C = confirmed
3. Hazard rating (low, medium, or high) H = high

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 0.80 = 64

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

64 x 1.00 = 64

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			80	108
Subscore (100 x factor score subtotal/maximum score subtotal)				74
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			44	114
Subscore (100 x factor score subtotal/maximum score subtotal)				39

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 74

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 47
Waste Characteristics 64
Pathways 74
Total 185 divided by 3 = 62 Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

62 x 1.00 = \ 62 \
FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Underground Waste Oil Tanks
Location: Building 1344
Date of Operation: 1972 to present
Owner/Operator: Blytheville AFB
Comments/Description: Spillage occurred during loading/unloading

Site Rated by: E.J.Schroeder; R.S.McLeod; S.J.Tiffany

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			98	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 54

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (small, medium, or large) S = small
2. Confidence level (confirmed or suspected) C = confirmed
3. Hazard rating (low, medium, or high) H = high

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 0.90 = 54

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

54 x 1.00 = 54

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			80	108
Subscore (100 x factor score subtotal/maximum score subtotal)				74
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			44	114
Subscore (100 x factor score subtotal/maximum score subtotal)				39

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 74

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors			54	
Waste Characteristics			54	
Pathways			74	
Total	183	divided by 3 =	61	Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

61 x 1.00 = \ 61 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Landfill No. 4
Location: North of munitions storage
Date of Operation: 1962 to present
Owner/Operator: Blytheville AFB
Comments/Description: Trench and fill daily cover

Site Rated by: E.J.Schroeder; R.S.McLeod; S.J.Tiffany

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			84	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 47

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (small, medium, or large) S = small
2. Confidence level (confirmed or suspected) C = confirmed
3. Hazard rating (low, medium, or high) H = high

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 0.80 = 48

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.00 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			80	108
Subscore (100 x factor score subtotal/maximum score subtotal)				74
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			44	114
Subscore (100 x factor score subtotal/maximum score subtotal)				39

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 74

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors			47
Waste Characteristics			48
Pathways			74
Total	169	divided by 3 =	56 Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

56 x 1.00 = 56

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Landfill No. 2
Location: By SAC Alert Area
Date of Operation: 1950 to 1954
Owner/Operator: Blytheville AFB
Comments/Description: Trench and fill, some burning, cover with grass over site

Site Rated by: E.J.Schroeder; R.S.McLeod; S.J.Tiffany

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			94	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 52

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (small, medium, or large) S = small
2. Confidence level (confirmed or suspected) S = suspected
3. Hazard rating (low, medium, or high) M = medium

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 0.80 = 32

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

32 x 1.00 = 32

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			88	108
Subscore (100 x factor score subtotal/maximum score subtotal)				81
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			36	114
Subscore (100 x factor score subtotal/maximum score subtotal)				32

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 81

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		52	
Waste Characteristics		32	
Pathways		81	
Total	166 divided by 3 =	55	Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

55 x 1.00 = \ 55 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Landfill No. 1
Location: East of water treatment plant
Date of Operation: 1942 to 1947
Owner/Operator: Blytheville AFB
Comments/Description: Trench and fill, some burning, closed with grass over site

Site Rated by: E.J.Schroeder; R.S.McLeod; S.J.Tiffany

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population wi. 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			100	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 56

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (small, medium, or large) S = small
2. Confidence level (confirmed or suspected) S = suspected
3. Hazard rating (low, medium, or high) H = high

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 0.80 = 32

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

32 x 1.00 = 32

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			80	108
Subscore (100 x factor score subtotal/maximum score subtotal)				74
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			44	114
Subscore (100 x factor score subtotal/maximum score subtotal)				39

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 74

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		56	
Waste Characteristics		32	
Pathways		74	
Total	162	divided by 3 =	54 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

54 x 1.00 = \ 54 \
FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Landfill No. 3
Location: West of munitions storage
Date of Operation: 1955 to 1962
Owner/Operator: Blytheville AFB
Comments/Description: Trench and fill; cover with grass and buildings

Site Rated by: E.J.Schroeder; R.S.McLeod; S.J.Tiffany

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			94	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 52

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (small, medium, or large) S = small
2. Confidence level (confirmed or suspected) S = suspected
3. Hazard rating (low, medium, or high) H = high

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 0.80 = 32

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

32 x 1.00 = 32

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			80	108
Subscore (100 x factor score subtotal/maximum score subtotal)				74
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			44	114
Subscore (100 x factor score subtotal/maximum score subtotal)				39

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 74

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors			52
Waste Characteristics			32
Pathways			74
Total	158	divided by 3 =	53 Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

53 x 1.00 = 53

FINAL SCORE

APPENDIX I

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

APPENDIX I

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

ABG: Air Base Group.

AF: Air Force.

AFB: Air Force Base.

AFCS: Air Force Communications Service.

AFESC: Air Force Engineering and Services Center.

AFFF: Aqueous Film Forming Foam, a fire extinquishing agent.

AFR: Air Force Regulation.

AFS: Air Force Station.

AGE: Aerospace Ground Equipment.

ALLUVIUM: Materials eroded, transported and deposited by streams.

AMS: Avionics Maintenance Squadron

ANG: Air National Guard.

ARTESIAN: Ground water which is under pressure significantly greater than atmospheric, and its upper limit is the bottom of a bed of distinctly lower hydraulic conductivity than that of the material in which the artesian water occurs.

AQUIFER: A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to a well or spring.

ARRS: Aerospace Rescue and Recovery Squadron.

ATC: Air Training Command

AVGAS: Aviation Gasoline.

BAFB: Blytheville Air Force Base

BEE: Bioenvironmental Engineer.

BES: Bioenvironmental Engineering Section.

BIOACCUMULATE: Tendency of elements or compounds to accumulate or build up in the tissues of living organisms when they are exposed to these elements in their environments, e.g., heavy metals.

CE: Civil Engineering.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act.

CES: Civil Engineering Squadron.

CIRCA: About; used to indicate an approximate date.

CLOSURE: The completion of a set of rigidly defined functions for a hazardous waste facility no longer in operation.

COD: Chemical Oxygen Demand, a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water.

COE: Corps of Engineers.

CONFINED AQUIFER: An aquifer bounded above and below by impermeable strata or by geologic units of distinctly lower permeability than that of the aquifer itself.

CONFINING UNIT: An aquitard or other poorly permeable layer which restricts the movement of ground water.

CONTAMINATION: The degradation of natural water quality to the extent that its usefulness is impaired; there is no implication of any specific limits since the degree of permissible contamination depends upon the intended end use or uses of the water.

CRS: Component Repair Squadron.

CSG: Combat Support Group.

DET: Detachment.

DISPOSAL FACILITY: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at which waste will remain after closure.

DISPOSAL OF HAZARDOUS WASTE: The discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground water.

DOD: Department of Defense.

DOWNGRADIENT: In the direction of decreasing hydraulic static head; the direction in which ground water flows.

DPDO: Defense Property Disposal Office, previously included Redistribution and Marketing (R&M) and Salvage.

DUMP: An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics; dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers.

EFFLUENT: A liquid waste discharge from a manufacturing or treatment process, in its natural state, or partially or completely treated, that discharges into the environment.

EMS: Equipment Maintenance Squadron.

EOD: Explosive Ordnance Disposal.

EP: Extraction Procedure, the EPA's standard laboratory procedure for leachate generation.

EPA: U.S. Environmental Protection Agency.

FACILITY: Any land and appurtenances thereon and thereto used for the treatment, storage and/or disposal of hazardous wastes.

FAULT: A fracture in rock along which the adjacent rock surfaces are differentially displaced.

FLOOD PLAIN: The lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to a one percent or greater chance of flooding in any given year.

FLOW PATH: The direction or movement of ground water as governed principally by the hydraulic gradient.

FMS: Field Maintenance Squadron.

FPTA: Fire Protection Training Area.

GC/MS: Gas chromatograph/mass spectrophotometer, a laboratory procedure for identifying unknown compounds.

GLACIAL TILL: Unsorted and unstratified drift consisting of clay, sand, gravel and boulders which is deposited by or underneath a glacier.

GROUND WATER: Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure.

GROUND WATER RESERVOIR: The earth materials and the intervening open spaces that contain ground water.

GPM: Gallons per minute.

HARDFILL: Disposal sites receiving construction debris, wood, miscellaneous spoil material.

HARM: Hazard Assessment Rating Methodology.

HAZARDOUS WASTE: As defined in RCRA, a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

HAZARDOUS WASTE GENERATION: The act or process of producing a hazardous waste.

HEAVY METALS: Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but which become toxic at higher concentrations.

HQ: Headquarters.

HWMF: Hazardous Waste Management Facility.

HYDRAULIC CONDUCTIVITY: A quantitive measure of the ability of porous material to transmit water.

ICBM: Intercontinental Ballistic Missile.

ILS: Instrument Landing System.

INFILTRATION: The movement of water through the soil surface into the ground.

IRP: Installation Restoration Program.

JP-4: Jet Propulsion Fuel Number Four; contains both kerosene and gasoline fractions.

LEACHATE: A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water.

LEACHING: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

LINER: A continous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill, or landfill cell which restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate.

MAC: Military Airlift Command.

MAINT: Recording System Maintenance.

MAPS: Mobile Aerial Part Squadron

MEK: Methyl Ethyl Ketone.

MGD: Million Gallons per Day.

MMS: Munitions Maintenance Squadron

MOGAS: Motor gasoline.

MONITORING WELL: A well used to measure ground-water levels and to obtain samples.

MUNITION ITEMS: Munitions or portions of munitions having an explosive potential.

MUNITIONS RESIDUE: Non-explosive segments of waste munitions (i.e., bomb casings).

NCO: Non-commissioned Officer.

NCOIC: Non-commissioned Officer In-Charge.

NDI: Non-destructive Inspection.

NET PRECIPITATION: The amount of annual precipitation minus annual evaporation.

NGVD: National Geodetic Vertical Datum of 1929.

NPDES: National Pollutant Discharge Elimination System.

OIC: Officer-In-Charge.

OMS: Organizational Maintenance Squadron.

ORGANIC: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon.

OSI: Office of Special Investigations.

OVA: Organic Vapor Analyzer.

O/W SEPARATOR: Oil and water separator.

O&G: Symbols for oil and grease.

PCB: Polychlorinated Biphenyl; liquids used as a dielectrics in electrical equipment.

PERCOLATION: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.

PERMEABILITY: The capacity of a porous rock, soil or sediment for transmitting a fluid without damage to the structure of the medium.

PD-680: Cleaning solvent.

pH: Negative logarithm of hydrogen ion concentration.

PL: Public Law.

PMEL: Precision Measurement Equipment Lab.

POL: Petroleum, Oils and Lubricants.

POLLUTANT: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose.

POTENTIOMETRIC SURFACE: The imaginery surface to which water in an artesian aquifer would rise in tightly cased wells penetrating it.

PPB: Parts per billion by weight.

PPM: Parts per million by weight.

PRECIPITATION: Rainfall.

PVC: Polyvinyl chloride.

QUATERNARY MATERIALS: The second period of the Cenozoic geologic era, following the Tertiary, and including the last 2-3 million years.

RCRA: Resource Conservation and Recovery Act.

RECHARGE AREA: A surface area in which surface water or precipitation percolates through the unsaturated zone and eventually reaches the zone of saturation. Recharge areas may be natural or manmade.

RECHARGE: The addition of water to the ground-water system by natural or artificial processes.

RECON: Reconnaissance.

RPIE: Real Property installed Equipment.

SAC: Strategic Air Command.

SANITARY LANDFILL: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes environmental hazards.

SATURATED ZONE: That part of the earth's crust in which all voids are filled with water.

SCS: U.S. Department of Agriculture Soil Conservation Service.

SLUDGE: The solid residue resulting from a manufacturing or wastewater treatment process which also produces a liquid stream. The residue which accumulates in liquid fuel storage tanks.

SOLID WASTE: Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

SPS: Security Police Squadron:

SPILL: Any unplanned release or discharge of a hazardous waste onto or into the air, land, or water.

STORAGE OF HAZARDOUS WASTE: Containment, either on a temporary basis or for a longer period, in such a manner as not to constitute disposal of such hazardous waste.

STP: Sewage Treatment Plant.

TAC: Tactical Air Command.

TACC: Tactical Air Control Center.

TASS: Tactical Air Support Squadron.

TAW: Tactical Airlift Wing.

TCA: 1,1,1,-Trichloroethane.

TCE: Trichloroethylene, a solvent and suspected carcinogen.

TDS: Total Dissolved Solids.

TOC: Total Organic Carbon.

TOXICITY: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism.

TRANSMISSIVITY: The rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

TREATMENT OF HAZARDOUS WASTE: Any method, technique, or process including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous.

TTW: Technical Training Wing.

UPGRADIENT: In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of ground-water.

USAF: United States Air Force.

USATHMA: United States Army Toxic and Hazardous Materials Agency.

USGS: United States Geological Survey.

WATER TABLE: Surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

APPENDIX J

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REFERENCES

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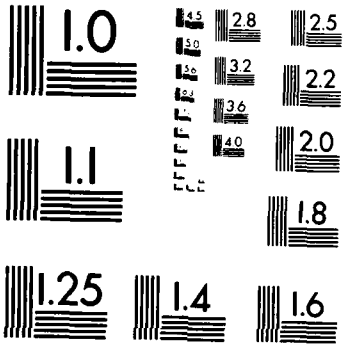
AD-A227 042 INSTALLATION RESTORATION PROGRAM PHASE 1: RECORDS . 3/3
SEARCH BLYTHEVILLE AIR FORCE BASE ARKANSAS(U)
ENGINEERING-SCIENCE INC ATLANTA GA AUG 85

UNCLASSIFIED F/G 24/7 NL+.



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

APPENDIX K

INDEX OF REFERENCES TO POTENTIAL CONTAMINATION SITES AT BLYTHEVILLE AFB

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INDEX OF REFERENCES TO POTENTIAL
CONTAMINATION SITES AT BLYTHEVILLE AFB

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